YAMAHA

YXR660FAS

SERVICE MANUAL

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EBS00001

YXR660FAS
SERVICE MANUAL
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NOTICE

This manual was produced by the Yamaha Motor Company primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual, so it is assumed that anyone who uses this book to perform maintenance and repairs on Yamaha vehicle has a basic understanding of the mechanical ideas and the procedures of vehicle repair. Repairs attempted by anyone without this knowledge are likely to render the vehicle unsafe and unfit for use.

Yamaha Motor Company, Ltd. is continually striving to improve all its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized Yamaha dealers and will appear in future editions of this manual where applicable.

NOTE:

Designs and specifications are subject to change without notice.

EBS00003

IMPORTANT INFORMATION

Particularly important information is distinguished in this manual by the following notations.

The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

⚠ WARNING Failure to follow WARNING instructions could result in severe injury or death to the vehicle operator, passenger, a bystander, or a person checking or repairing the vehicle.

CAUTION: A CAUTION indicates special precautions that must be taken to avoid damage to the vehicle.

NOTE: A NOTE provides key information to make procedures easier or clearer.

EBS00004

HOW TO USE THIS MANUAL

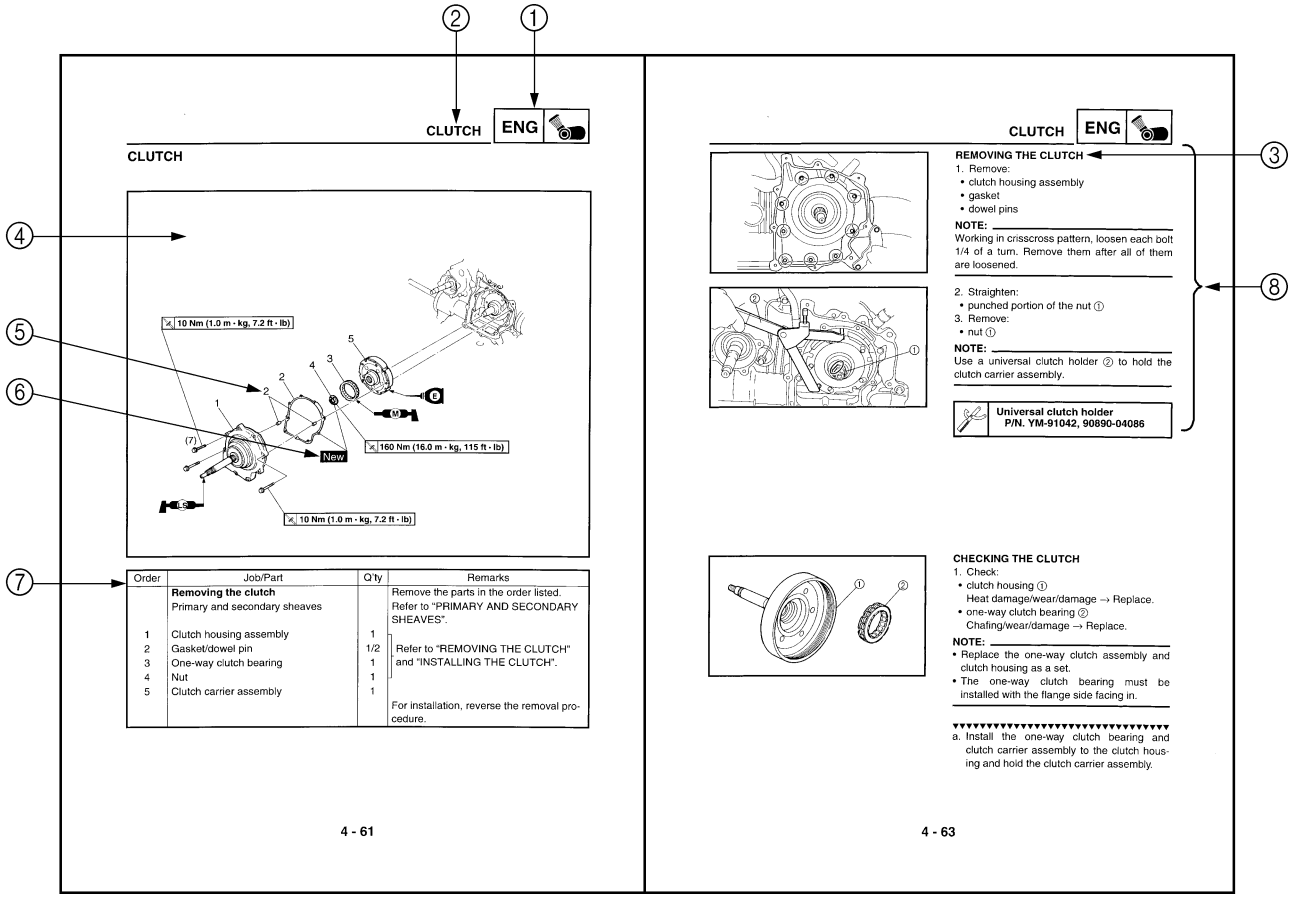
MANUAL ORGANIZATION

This manual consists of chapters for the main categories of subjects. (See “symbols”)
1st title ①: This is the title of the chapter with its symbol in the upper right corner of each page.
2nd title ②: This title indicates the section of the chapter and only appears on the first page of each section. It is located in the upper left corner of the page.
3rd title ③: This title indicates a sub-section that is followed by step-by-step procedures accompanied by corresponding illustrations.

EXPLODED DIAGRAMS

To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

1. An easy-to-see exploded diagram ④ is provided for removal and disassembly jobs.
2. Numbers ⑤ are given in the order of the jobs in the exploded diagram. A number that is enclosed by a circle indicates a disassembly step.
3. An explanation of jobs and notes is presented in an easy-to-read way by the use of symbol marks ⑥. The meanings of the symbol marks are given on the next page.
4. A job instruction chart ⑦ accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
5. For jobs requiring more information, the step-by-step format supplements ⑧ are given in addition to the exploded diagram and the job instruction chart.


②
①
CLUTCH
ENG
CLUTCH
④
⑤
⑥
⑦
10 Nm (1.0 m · kg, 7.2 ft · lb)
160 Nm (16.0 m · kg, 115 ft · lb)
New
10 Nm (1.0 m · kg, 7.2 ft · lb)
Order | Job/Part | Q'ty | Remarks
Removing the clutch | | Remove the parts in the order listed.
Primary and secondary sheaves | | Refer to “PRIMARY AND SECONDARY SHEAVES”.
1 | Clutch housing assembly | 1 |
2 | Gasket/dowel pin | 1/2 | Refer to “REMOVING THE CLUTCH” and “INSTALLING THE CLUTCH”.
3 | One-way clutch bearing | 1 |
4 | Nut | 1 |
5 | Clutch carrier assembly | 1 |
For installation, reverse the removal procedure.
4 - 61
CLUTCH
ENG
③
⑧
REMOVING THE CLUTCH
1. Remove:
• clutch housing assembly
• gasket
• dowel pins
NOTE:
Working in crisscross pattern, loosen each bolt 1/4 of a turn. Remove them after all of them are loosened.
2. Straighten:
• punched portion of the nut ①
3. Remove:
• nut ①
NOTE:
Use a universal clutch holder ② to hold the clutch carrier assembly.
Universal clutch holder
P/N. YM-91042, 90890-04086
CHECKING THE CLUTCH
1. Check:
• clutch housing ①
Heat damage/wear/damage → Replace.
• one-way clutch bearing ②
Chafing/wear/damage → Replace.
NOTE:
• Replace the one-way clutch assembly and clutch housing as a set.
• The one-way clutch bearing must be installed with the flange side facing in.
a. Install the one-way clutch bearing and clutch carrier assembly to the clutch housing and hold the clutch carrier assembly.
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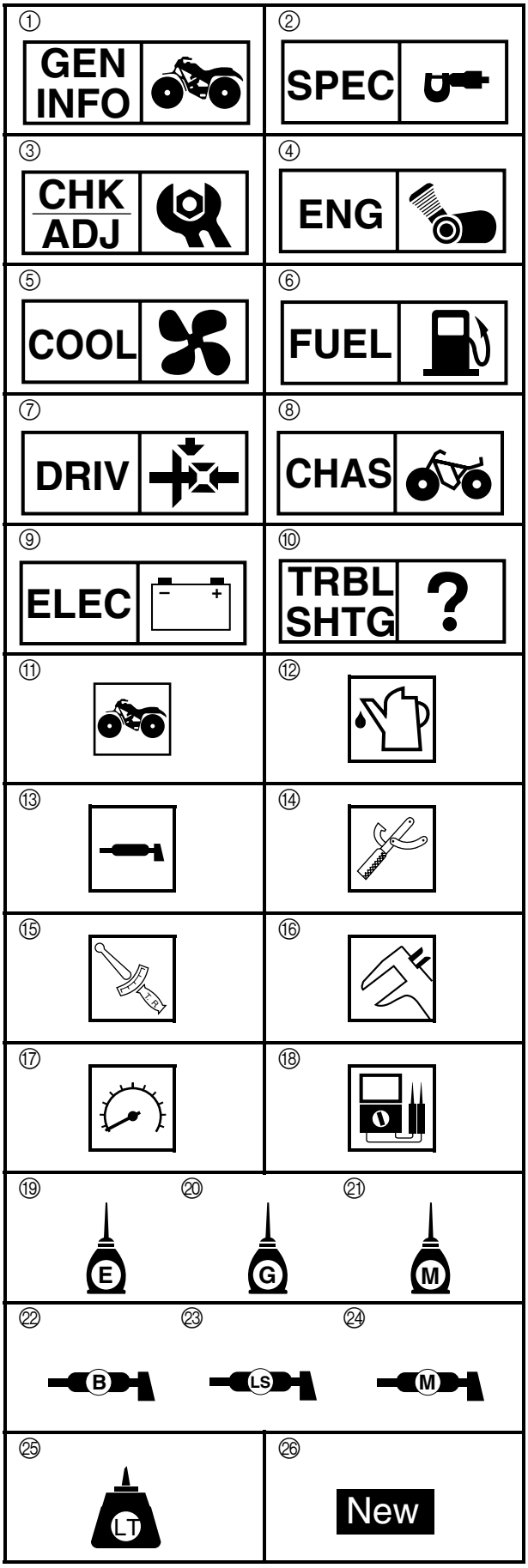

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SYMBOLS

The following symbols are not relevant to every vehicle.

Symbols ① to ⑩ indicate the subject of each chapter.

① General information
② Specifications
③ Periodic checks and adjustments
④ Engine
⑤ Cooling system
⑥ Fuel system
⑦ Drive train
⑧ Chassis
⑨ Electrical
⑩ Troubleshooting

Symbols ⑪ to ⑱ indicate the following.

⑪ Can be serviced with engine mounted
⑫ Filling fluid
⑬ Lubricant
⑭ Special tool
⑮ Torque
⑯ Wear limit, clearance
⑰ Engine speed
⑱ Electrical data (Ω, V, A)

Symbols ⑲ to ㉔ in the exploded diagrams indicate the types of lubricants and lubrication points.

⑲ Apply engine oil
⑳ Apply gear oil
㉑ Apply molybdenum disulfide oil
㉒ Apply wheel bearing grease
㉓ Apply lithium-soap-based grease
㉔ Apply molybdenum disulfide grease

Symbols ㉕ to ㉖ in the exploded diagrams indicate where to apply a locking agent ㉕ and when to install a new part ㉖.

㉕ Apply the locking agent (LOCTITE®)
㉖ Replace

EBS00008

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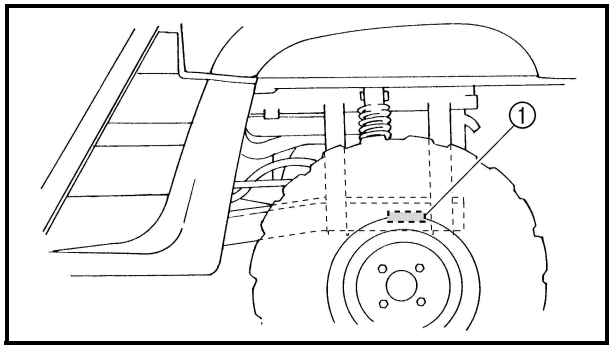
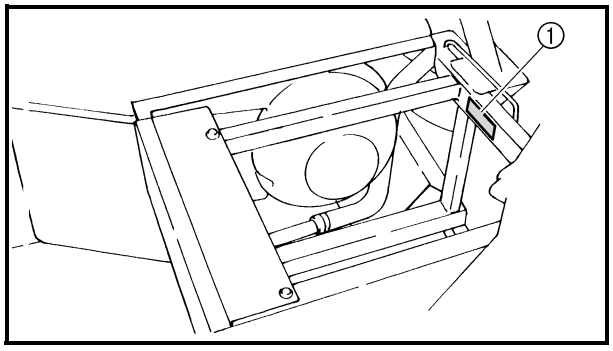


GENERAL INFORMATION

VEHICLE IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER

The vehicle identification number ① is stamped into the left side of the frame.



MODEL LABEL

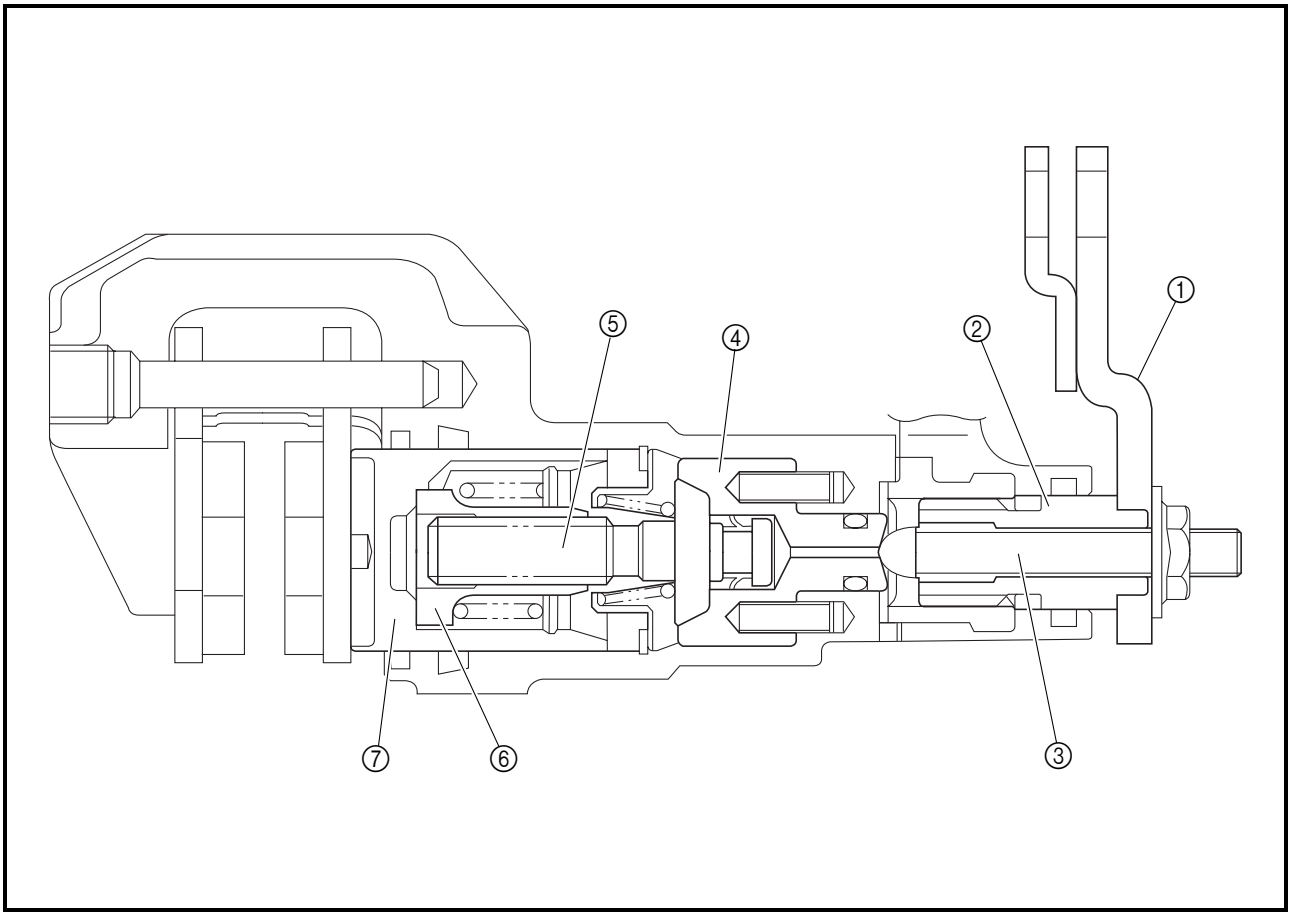
The model label ① is affixed to the frame. This information will be needed to order spare parts.

FEATURES

SELF-ADJUSTING PARKING BRAKE MECHANISM

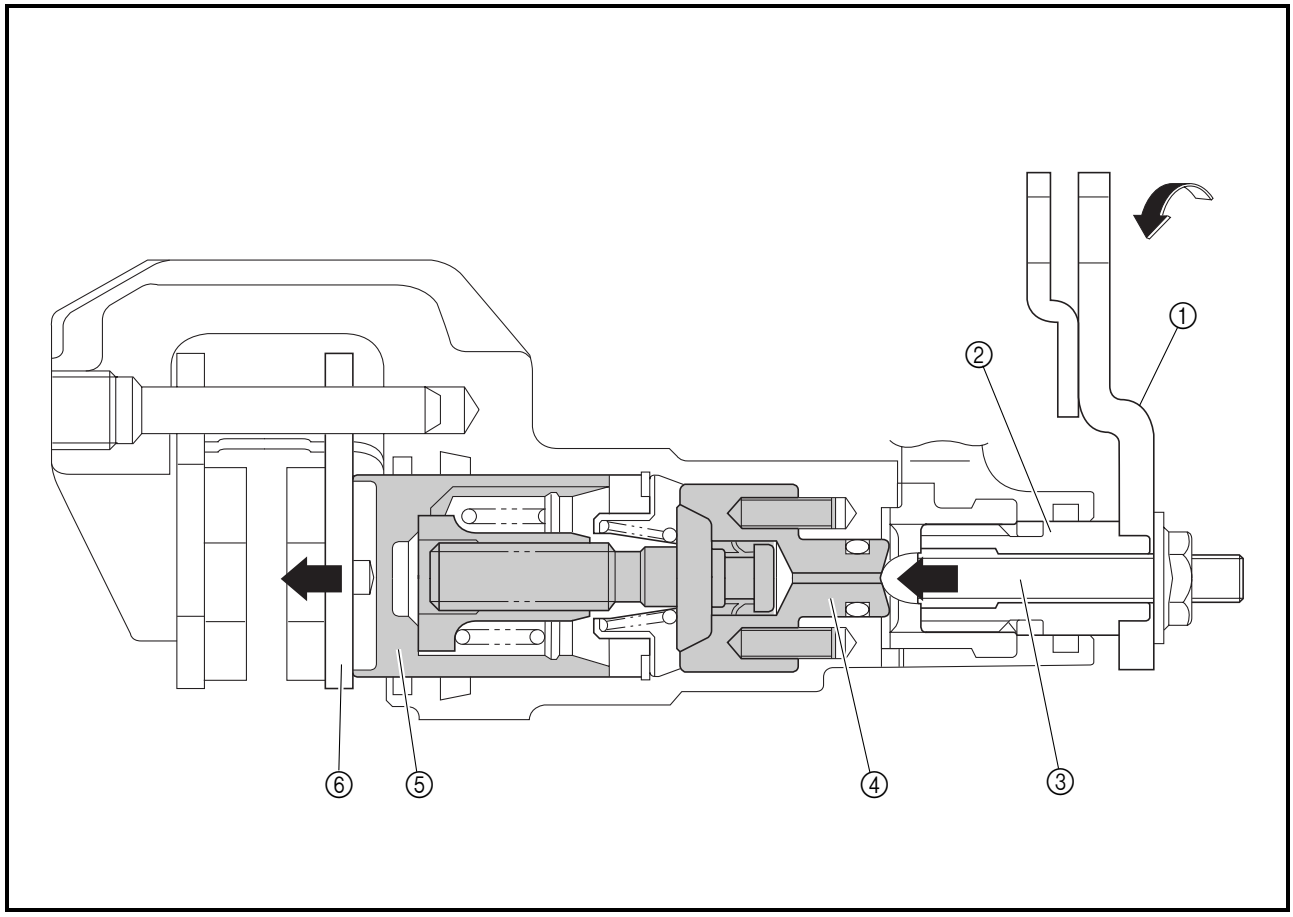
Usually, for vehicles equipped with a parking brake that must be adjusted manually, it is necessary to adjust the adjusting bolt to achieve the proper clearance between the brake caliper piston and the adjusting bolt.

This adjustment procedure is unnecessary for vehicles equipped with a self-adjusting parking brake mechanism. The proper clearance is automatically maintained at all times, ensuring stable braking performance when parking the vehicle.



① Parking brake arm
② Parking brake arm shaft
③ Set bolt
④ Adjusting bolt sleeve
⑤ Adjusting bolt
⑥ Nut
⑦ Brake caliper piston

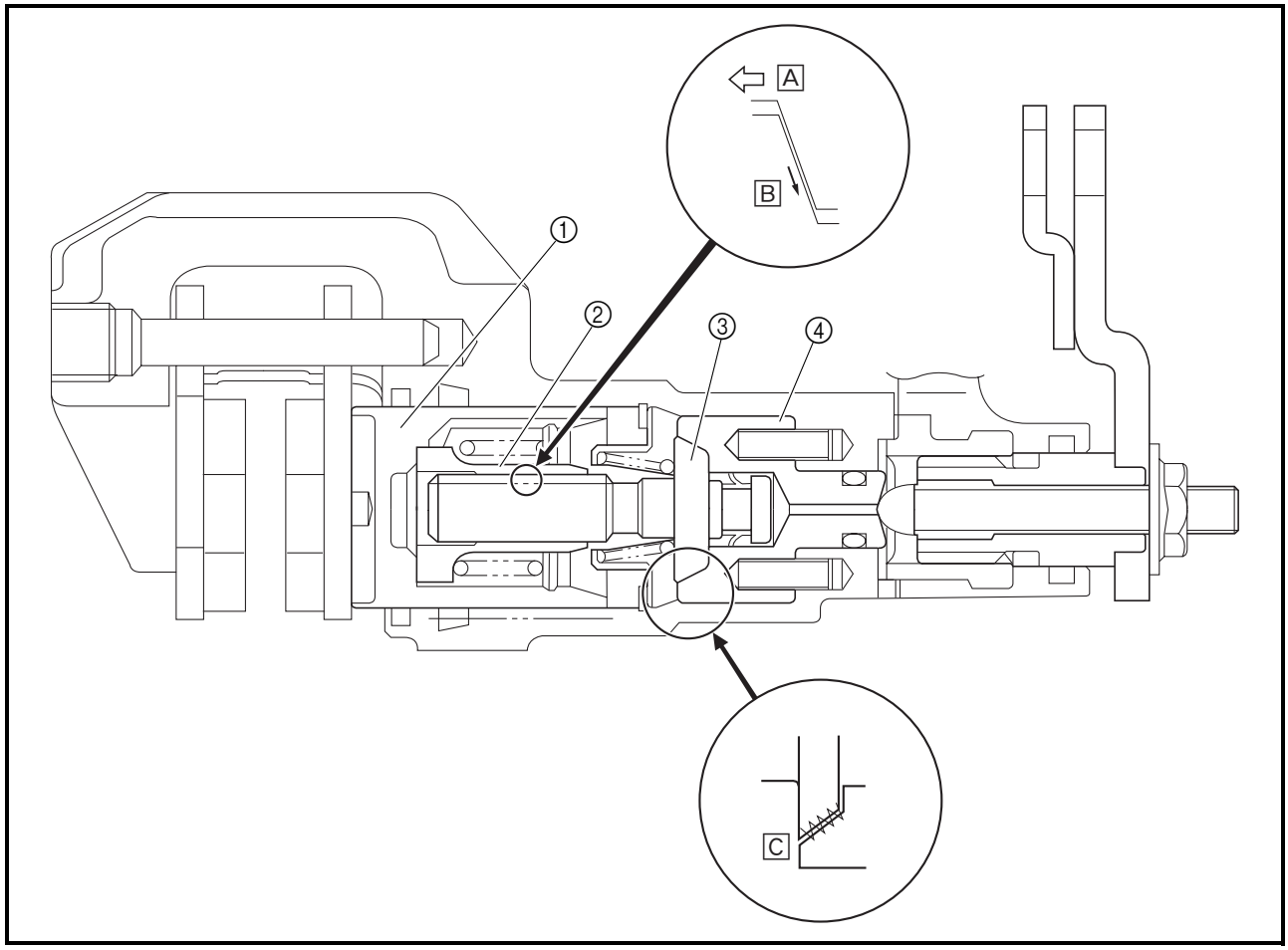
Parking Brake Operation



① Parking brake arm
② Parking brake arm shaft
③ Set bolt
④ Adjusting bolt sleeve
⑤ Brake caliper piston
⑥ Brake pad

When the parking brake is operated, the parking brake cable turns the parking brake arm ①. The rotation of the parking brake arm is changed to axial thrust in the parking brake arm shaft ② and the set bolt ③ is pushed against the adjusting bolt sleeve ④.
When the adjusting bolt sleeve receives the force, the dark shaded area in the above illustration is pushed together and the brake pad ⑥ is pushed against the brake disc.
When the brake pad wears, the clearance between the brake caliper piston ⑤ and the brake pad becomes larger and the force applied to the brake pad becomes weaker.
If this occurs, the self-adjusting parking brake mechanism adjusts automatically to achieve the proper clearance.

Parking Brake Adjustment



① Brake caliper piston
② Nut
③ Adjusting bolt
④ Adjusting bolt sleeve

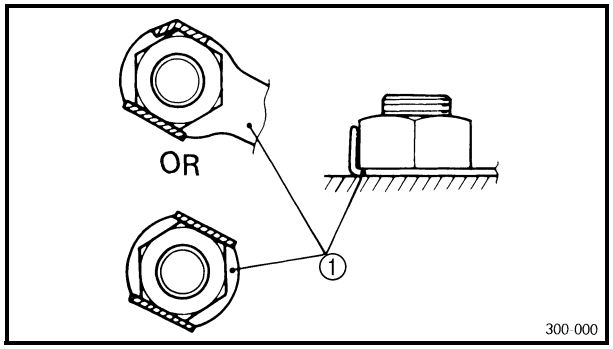
When the brake pedal is operated, the brake fluid pressure in the master cylinder increases and the brake caliper piston ① and the nut ② are pushed.
When there is proper clearance between the brake caliper piston and the brake pad, no other parts move because the movement of the brake caliper piston and the nut is absorbed by the backlash of the threads of the nut and the adjusting bolt ③.
When the movement of the nut is greater than the backlash between the nut and the adjusting bolt, the parking brake adjusts automatically.
The amount of the adjustment varies with brake fluid pressure. Operating the parking brake makes no adjustment.
The adjustment operation is as follows.

1. When the brake pedal is operated, the brake fluid pressure increases and the brake caliper piston and the nut move.
2. When the movement of the brake caliper piston and the nut is greater than the backlash of the threads of the nut and the adjusting bolt, the force [A] will be required to pull the adjusting bolt. The force to pull the adjusting bolt will be turned into the rotation torque [B] by the shape of the threads of the nut and the adjusting bolt.
3. At this time, the clutch torque [C] between the adjusting bolt and the adjusting bolt sleeve ④ will decrease depending on the force required to pull the adjusting bolt.
   When the rotation torque exceeds the clutch torque, the adjusting bolt rotates and the clearance between the brake caliper piston and the brake pad decreases by the movement of the threads of the nut and the adjusting bolt.

EB101000
IMPORTANT INFORMATION
PREPARATION FOR REMOVAL PROCEDURES
1. Remove all dirt, mud, dust and foreign material before removal and disassembly.
2. Use proper tools and cleaning equipment. Refer to “SPECIAL TOOLS”.
3. When disassembling the vehicle, always keep mated parts together. This includes gears, cylinder, piston and other parts that have been “mated” through normal wear. Mated parts must always be reused or replaced as an assembly.
4. During vehicle disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

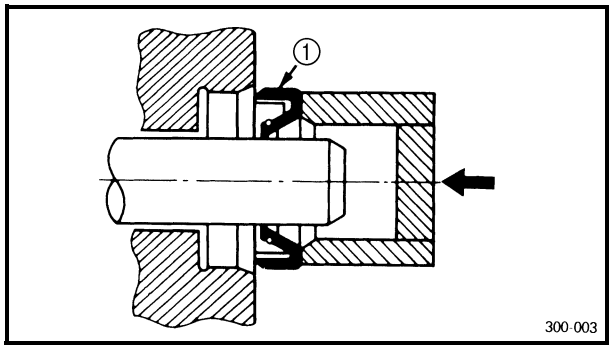
EB101010
REPLACEMENT PARTS
1. Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

EB101020
GASKETS, OIL SEALS AND O-RINGS
1. Replace all gaskets, seals and O-rings when overhauling the engine. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.



EB101030
LOCK WASHERS/PLATES AND COTTER PINS

1. Replace all lock washers/plates ① and cotter pins after removal. Bend lock tabs along the bolt or nut flats after the bolt or nut has been tightened to specification.



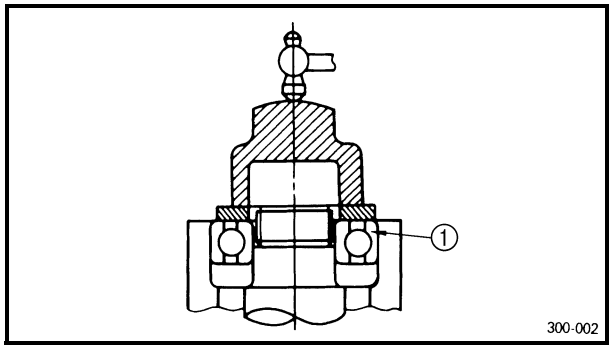
EB101040
BEARINGS AND OIL SEALS

1. Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, apply a light coating of lithium-soap-based grease to the seal lips. Oil bearings liberally when installing, if appropriate.

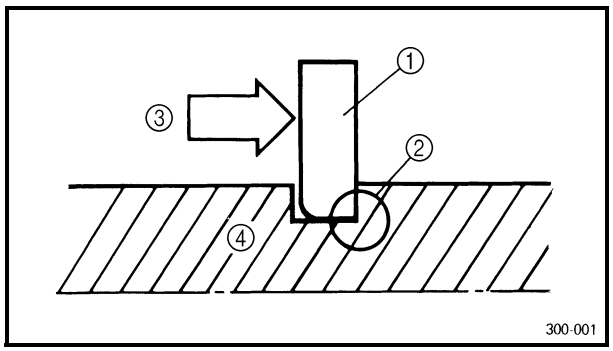
① Oil seal

CAUTION:

Do not use compressed air to spin the bearings dry. This will damage the bearing surfaces.



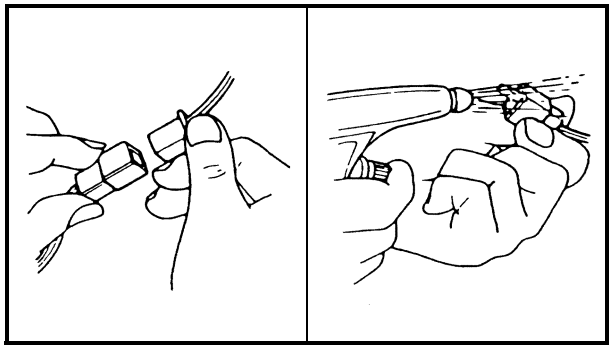
① Bearing

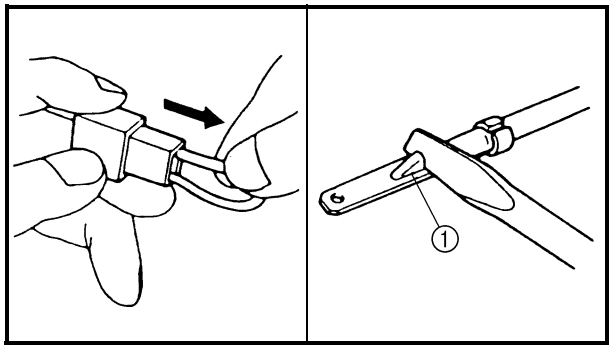


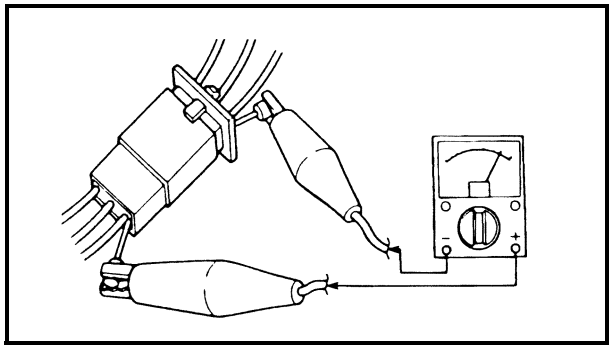
EB101050
CIRCLIPS

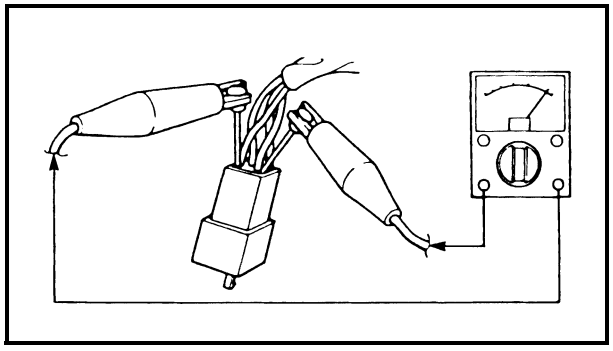
1. Check all circlips carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip ①, make sure that the sharp-edged corner ② is positioned opposite the thrust ③ it receives. See sectional view.

④ Shaft









EB801000

CHECKING OF CONNECTIONS

Check the connectors for stains, rust, moisture, etc.

1. Disconnect:
   - Connector
2. Check:
   - Connector
     Moisture → Dry each terminal with an air blower.
     Stains/rust → Connect and disconnect the terminals several times.
3. Check:
   - Connector leads
     Looseness → Bend up the pin ① and connect the terminals.

4. Connect:
   - Connector terminals

NOTE:
The two terminals “click” together.

5. Check:
   - Continuity (using a pocket tester)

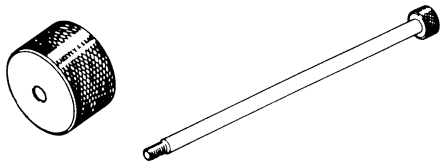
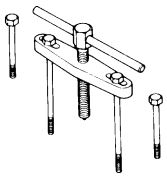
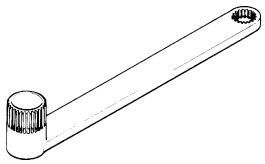
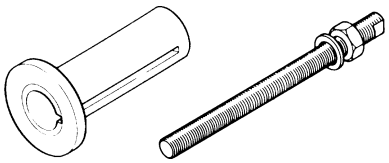
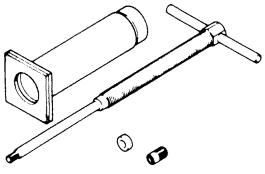
NOTE:
- If there is no continuity, clean the terminals.
- When checking the wire harness be sure to perform steps 1 to 3.
- As a quick remedy, use a contact revitalizer available at most part stores.
- Check the connector with a pocket tester as shown.

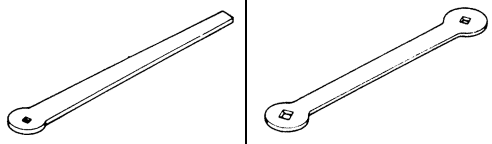
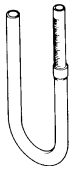
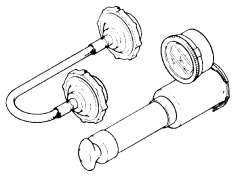
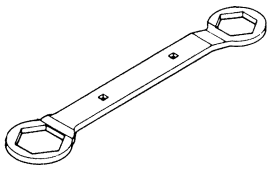
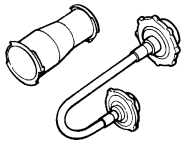
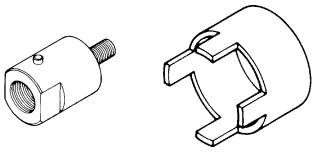
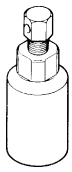
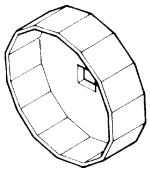
EB102001

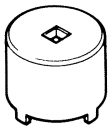
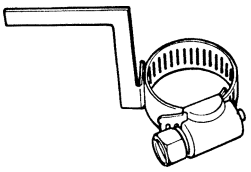
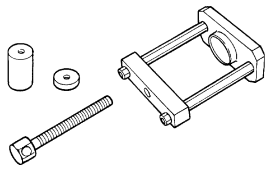
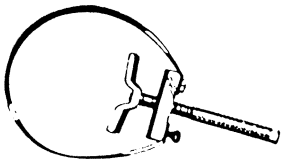
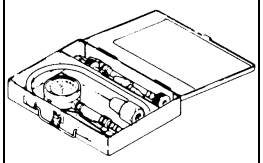
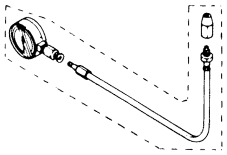
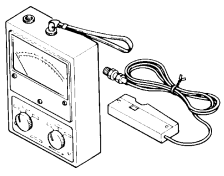
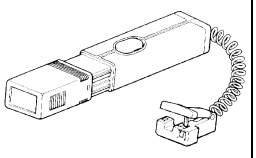
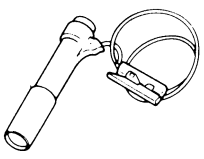
SPECIAL TOOLS

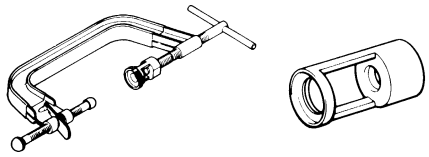
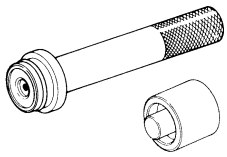
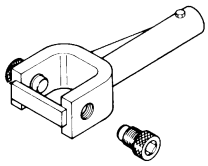
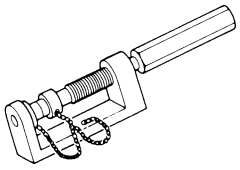
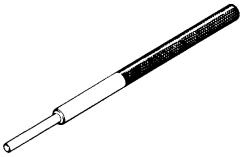
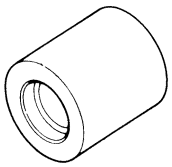
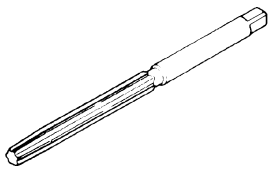
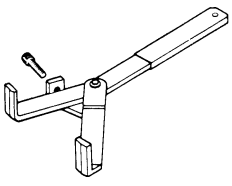
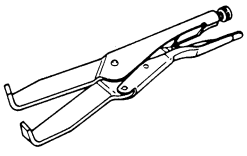
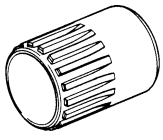
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools; this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools may differ by shape and part number from country to country. In such a case, two types are provided.
When placing an order, refer to the list provided below to avoid any mistakes.

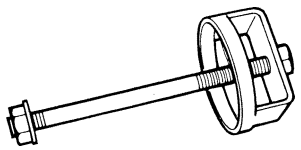
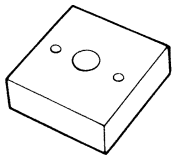
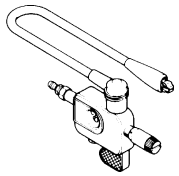
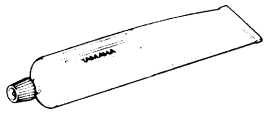
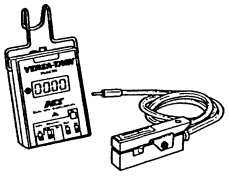
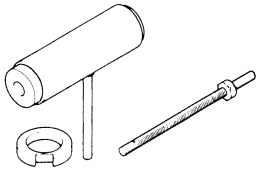
For US and CDN
P/N. YM-, YU-, YS-, YK-, ACC-
Except for US and CDN
P/N. 90890-

Tool No.	Tool name/Function	Illustration
Bolt 90890-01083 Weight 90890-01084 Set YU-01083-A	Slide hammer bolt (M6)/weight/set These tools are used to remove the rocker arm shaft.	
90890-01135 YU-01135-A	Crankcase separating tool This tool is used to separate the crankcase.	
90890-01229 YM-01229	Coupling gear/middle shaft tool This tool is needed when removing or installing the coupling gear nut.	
Pot 90890-01274 Bolt 90890-01275	Crankshaft installer pot Crankshaft installer bolt These tools are used to install the crankshaft.	
90890-01304 YU-01304	Piston pin puller This tool is used to remove the piston pin.	
90890-01309	Spacer This tool is used to install the crankshaft.	

Tool No.	Tool name/Function	Illustration
90890-01311 YM-08035-A	Tappet adjusting tool This tool is necessary for adjusting the valve clearance.	
90890-01312 YM-01312-A	Fuel level gauge This gauge is used to measure the fuel level in the float chamber.	
90890-01325 YU-24460-01	Radiator cap tester This tool is used to check the cooling system.	
90890-01348 YM-01348	Locknut wrench This tool is needed when removing or installing the secondary sheave spring.	
90890-01352 YU-33984	Radiator cap tester adapter This tool is used to check the cooling system.	
Adapter 90890-01383 YM-01383 Spacer 90890-04081 YM-91044	Adapter Spacer (crankshaft installer) These tools are used to install the crankshaft.	
90890-01404 YM-01404	Flywheel puller These tools are needed to remove the rotor.	
90890-01426 YU-38411	Oil filter wrench This tool is needed to loosen or tighten the oil filter cartridge.	

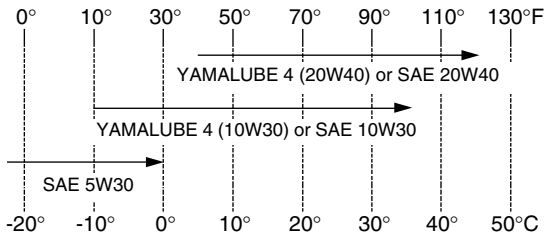
Tool No.	Tool name/Function	Illustration
90890-01430 YM-38404	Ring nut wrench This tool is needed to removing and installing the middle driven shaft bearing retainer.	
90890-01467 YM-01467	Gear lash measurement tool This tool is used to measure the gear lash.	
90890-01474 YM-01474	Ball joint remover/installer set Ball joint adapter set These tools are used to removing or installing the ball joints.	
90890-01701 YS-01880-A	Sheave holder Primary sheave holder This tool is needed to hold the primary sheave when removing or installing the sheave bolts.	
Set 90890-03081 YU-33223 Adapter 90890-04082 YU-33223-4	Compression gauge Adapter (compression gauge) These tools are needed to measure engine compression.	 
90890-03112 YU-03112-C	Pocket tester This instrument is needed for checking the electrical system.	
90890-03113	Engine tachometer This tool is needed for observing engine rpm.	
90890-03141 YM-33277-A	Timing light Battery powered timing light This tool is necessary for checking ignition timing.	 

Tool No.	Tool name/Function	Illustration
Compressor 90890-04019 YM-04019 Attachment 90890-01243 YM-01253-1	Valve spring compressor Valve spring compressor attachment This tool is needed to remove and install the valve assemblies.	
Middle driven shaft bearing driver 90890-04058 YM-04058-1 Mechanical seal installer 90890-04078 YM-33221	Middle driven shaft bearing driver Mechanical seal installer Water pump seal installer These tools are used to install the water pump seal.	
90890-04062 YM-04062	Universal joint holder This tool is needed when removing or installing the universal joint yoke nut.	 
90890-04064 YM-04064-A	Valve guide remover (ø 6) This tool is needed to remove and install the valve guide.	
90890-04065 YM-04065-A	Valve guide installer (ø 6) This tool is needed to install the valve guide.	
90890-04066 YM-04066	Valve guide reamer (ø 6) This tool is needed to rebore the new valve guide.	
90890-04086 YM-91042	Universal clutch holder This tool is needed to hold the clutch carrier when removing or installing the carrier nut.	 
90890-04128 YM-04128	Bearing retainer wrench This tool is needed when removing or installing the bearing retainer.	

Tool No.	Tool name/Function	Illustration
90890-04134 YM-04134	Sheave spring compressor This tool is needed when removing or installing the secondary sheave spring.	
90890-04135 YM-04135	Sheave fixed block This tool is needed when removing or installing the secondary sheave spring.	
90890-06754 YM-34487	Ignition checker Pulse ignition spark checker This instrument is necessary for checking the ignition system components.	
Bond 90890-85505 Sealant ACC-11001-05-01	Yamaha bond No. 1215 Sealant (Quick Gasket®) This sealant (bond) is used on crankcase mating surfaces, etc.	
YM-01477	Ball joint remover/installer attachment set This tool is used to remove and install the ball joints.	
YU-8036-C	Digital engine test tachometer This tool is needed for observing engine rpm.	
YU-90050	Crankshaft installer set These tools are used to install the crankshaft.	

SPECIFICATIONS

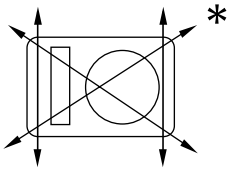
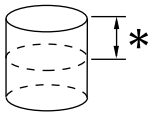
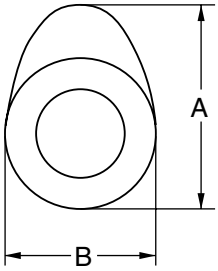
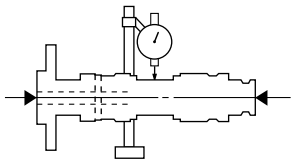
GENERAL SPECIFICATIONS

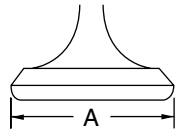
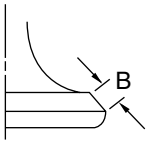
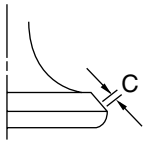
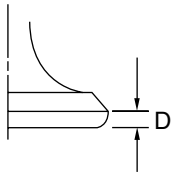
Item	Standard
Model code	5UG1
Dimensions	
Overall length	2,885 mm (113.6 in)
Overall width	1,385 mm (54.5 in)
Overall height	1,853 mm (73.0 in)
Seat height	818 mm (32.2 in)
Wheelbase	1,910 mm (75.2 in)
Minimum ground clearance	273 mm (10.75 in)
Minimum turning radius	3,900 mm (153.5 in)
Basic weight	
With oil and full fuel tank	510 kg (1,124 lb)
Engine	
Engine type	Liquid-cooled 4-stroke, SOHC
Cylinder arrangement	Forward-inclined single cylinder
Displacement	660 cm^3
Bore × stroke	100 × 84 mm (3.94 × 3.31 in)
Compression ratio	9.1 : 1
Standard compression pressure (at sea level)	1,324 kPa (13.24 kg/cm^2, 188.31 psi) at 850 r/min
Starting system	Electric starter
Lubrication system	Wet sump
Oil type or grade	
Engine oil	 API service SE, SF, SG type or higher
Final gear oil	SAE 80API “GL-4” Hypoid Gear Oil
Differential gear oil	SAE 80API “GL-4” Hypoid Gear Oil
Oil capacity	
Engine oil	
Periodic oil change	2.10 L (1.85 Imp qt, 2.22 US qt)
With oil filter replacement	2.20 L (1.94 Imp qt, 2.33 US qt)
Total amount	2.40 L (2.11 Imp qt, 2.54 US qt)
Final gear case oil	
Periodic oil change	0.25 L (0.22 Imp qt, 0.26 US qt)
Total amount	0.28 L (0.25 Imp qt, 0.30 US qt)

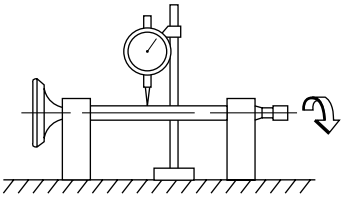
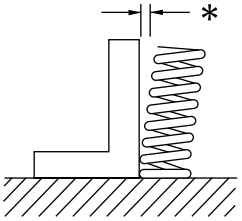
Item		Standard
Differential gear case oil		
Periodic oil change		0.32 L (0.28 Imp qt, 0.34 US qt)
Total amount		0.33 L (0.29 Imp qt, 0.35 US qt)
Air filter		Wet type element
Fuel		
Type		Unleaded gasoline only
Fuel tank capacity		30 L (6.60 Imp gal, 7.93 US gal)
Carburetor		
Type/quantity		BSR42/1
Manufacturer		MIKUNI
Spark plug		
Type/manufacturer		DPR8EA–9/NGK
Spark plug gap		0.8 ~ 0.9 mm (0.031 ~ 0.035 in)
Clutch type		Wet, centrifugal automatic
Transmission		
Primary reduction system		V-belt
Secondary reduction system		Shaft drive
Secondary reduction ratio		41/21 × 24/18 × 33/9 (9.544)
Transmission type		V-belt automatic
Operation		Right hand operation
Single speed automatic		2.37 ~ 0.91 : 1
Sub transmission ratio	low	35/17 (2.058)
	high	28/19 (1.473)
Reverse gear		25/17 (1.471)
Chassis		
Frame type		Steel tube frame
Caster angle		5.0°
Camber angle		0°
Kingpin angle		12°
Kingpin offset		0 mm (0 in)
Trail		26 mm (1.02 in)
Tread (STD)	front	1,115 mm (43.90 in)
	rear	1,107 mm (43.58 in)
Toe-in		0 ~ 10 mm (0.00 ~ 0.39 in)
Tire		
Type		Tubeless
Size	front	AT25 × 8–12NHS
	rear	AT25 × 10–12NHS
Manufacturer	front	GOODYEAR
	rear	GOODYEAR
Type	front	Rawhide RS
	rear	Rawhide RS

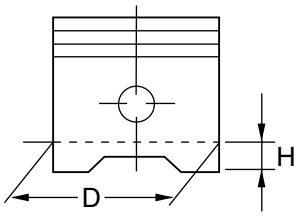
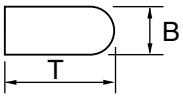
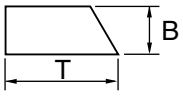
Item		Standard
Tire pressure (cold tire)		
Maximum load*		397 kg (876 lb)
Off-road riding	front	63 ~ 77 kPa (0.63 ~ 0.77 kg/cm^2, 9 ~ 11 psi)
	rear	91 ~ 105 kPa (0.91 ~ 1.05 kg/cm^2, 13 ~ 15 psi)
* Load in total weight of cargo, operator, passenger, accessories and tongue weight		
Brake		
Front brake	type	Dual disc brake
	operation	Foot brake
Rear brake	type	Single disc brake
	operation	Foot brake
Suspension		
Front suspension		Double wishbone
Rear suspension		Double wishbone
Shock absorber		
Front shock absorber		Coil spring/oil damper
Rear shock absorber		Coil spring/oil damper
Wheel travel		
Front wheel travel		185 mm (7.28 in)
Rear wheel travel		185 mm (7.28 in)
Electrical		
Ignition system		DC. C.D.I.
Generator system		A.C. magneto
Battery type		U1L-11
Battery capacity		12 V, 28 AH
Headlight type		Krypton bulb
Bulb wattage × quantity		
Headlight		12 V 30 W/30 W × 2
Tail/brake light		12 V 5 W/21 W × 2
Indicator lights		
Neutral		12 V 1.7 W × 1
Reverse		12 V 1.7 W × 1
Coolant temperature		12 V 1.7 W × 1
Parking brake		12 V 1.7 W × 1
Four-wheel drive		12 V 1.7 W × 1
Differential gear lock		12 V 1.7 W × 1

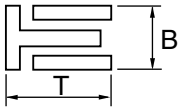
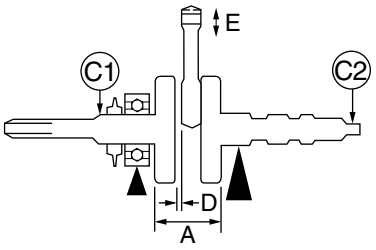
ENGINE SPECIFICATIONS

Item	Standard	Limit
Cylinder head		
Warp limit * 	----	0.03 mm (0.0012 in)
Cylinder		
Bore size	100.005 ~ 100.055 mm (3.9372 ~ 3.9392 in)	100.10 mm (3.9410 in)
Measuring point * 	50 mm (1.97 in)	----
Camshaft		
Drive method	Chain drive (Left)	----
Cam dimensions 		
Intake “A”	35.69 ~ 35.79 mm (1.4051 ~ 1.4091 in)	35.59 mm (1.4012 in)
“B”	30.06 ~ 30.16 mm (1.1835 ~ 1.1874 in)	29.96 mm (1.1795 in)
Exhaust “A”	36.50 ~ 36.60 mm (1.4370 ~ 1.4409 in)	36.40 mm (1.4331 in)
“B”	30.11 ~ 30.21 mm (1.1854 ~ 1.1894 in)	30.01 mm (1.1815 in)
Camshaft runout limit 	----	0.03 mm (0.0012 in)

Item		Standard	Limit
Cam chain			
Cam chain type/No. of links		92RH2010J/126M	----
Cam chain adjustment method		Automatic	----
Rocker arm/rocker arm shaft			
Rocker arm inside diameter		12.000 ~ 12.018 mm (0.4724 ~ 0.4731 in)	----
Shaft outside diameter		11.976 ~ 11.991 mm (0.4715 ~ 0.4721 in)	----
Arm-to-shaft clearance		0.009 ~ 0.042 mm (0.0004 ~ 0.0017 in)	----
Valve, valve seat, valve guide			
Valve clearance (cold)	IN	0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in)	----
	EX	0.15 ~ 0.20 mm (0.0059 ~ 0.0079 in)	----
Valve dimensions			
 Head Diameter		 Face Width	 Seat Width
 Margin Thickness			
"A" head diameter	IN	29.9 ~ 30.1 mm (1.1772 ~ 1.1850 in)	----
	EX	31.9 ~ 32.1 mm (1.2559 ~ 1.2638 in)	----
"B" face width	IN	2.25 mm (0.0900 in)	----
	EX	2.26 mm (0.0890 in)	----
"C" seat width	IN	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.6 mm (0.0630 in)
	EX	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.6 mm (0.0630 in)
"D" margin thickness	IN	0.85 ~ 1.15 mm (0.0335 ~ 0.0453 in)	----
	EX	0.85 ~ 1.15 mm (0.0335 ~ 0.0453 in)	----
Stem outside diameter	IN	5.975 ~ 5.990 mm (0.2352 ~ 0.2358 in)	5.945 mm (0.2341 in)
	EX	5.960 ~ 5.975 mm (0.2346 ~ 0.2352 in)	5.930 mm (0.2335 in)
Guide inside diameter	IN	6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in)	6.050 mm (0.2559 in)
	EX	6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in)	6.050 mm (0.2559 in)

Item		Standard	Limit
Stem-to-guide clearance	IN	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.08 mm (0.0031 in)
	EX	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)	0.10 mm (0.0039 in)
Stem runout limit		----	0.01 mm (0.0004 in)
			
Valve seat width	IN	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	----
	EX	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	----
Valve spring			
Inner spring			
Free length	IN	32.63 mm (1.28 in)	31.0 mm (1.22 in)
	EX	36.46 mm (1.44 in)	34.6 mm (1.36 in)
Set length (valve closed)	IN	27.5 mm (1.08 in)	----
	EX	31.0 mm (1.22 in)	----
Compressed pressure (installed)	IN	100.0 ~ 115.7 N (10.20 ~ 11.80 kg, 22.49 ~ 26.01 lb)	----
	EX	120.6 ~ 138.3 N (12.30 ~ 14.10 kg, 27.12 ~ 31.09 lb)	----
Tilt limit *	IN	----	2.5°/1.4 mm (2.5°/0.055 in)
	EX	----	2.5°/1.6 mm (2.5°/0.063 in)
			
Direction of winding (top view)	IN	Clockwise	----
	EX	Clockwise	----

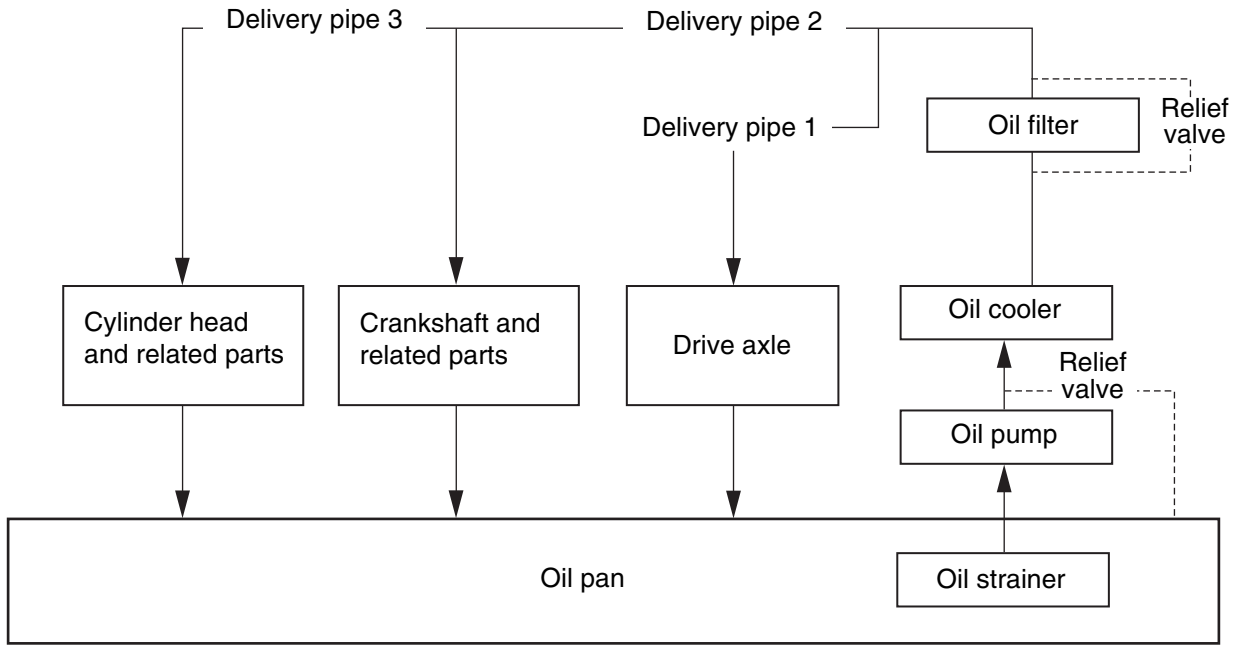
Item	Standard	Limit
Piston		
Piston to cylinder clearance	0.050 ~ 0.070 mm (0.0020 ~ 0.0028 in)	0.15 mm (0.0059 in)
Piston size "D"	99.945 ~ 99.995 mm (3.9348 ~ 3.9368 in)	----
		
Measuring point "H"	2.5 mm (0.10 in)	----
Piston off-set	1.0 mm (0.0394 in)	----
Off-set direction	Intake side	----
Piston pin bore inside diameter	22.004 ~ 22.015 mm (0.8663 ~ 0.8667 in)	22.045 mm (0.8679 in)
Piston pin outside diameter	21.991 ~ 22.000 mm (0.8658 ~ 0.8661 in)	21.971 mm (0.8650 in)
Piston rings		
Top ring		
		
Type	Barrel	----
Dimensions (B × T)	1.2 × 3.8 mm (0.0472 × 0.1496 in)	----
End gap (installed)	0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in)	0.70 mm (0.0276 in)
Side clearance (installed)	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)	0.13 mm (0.0051 in)
2nd ring		
		
Type	Taper	----
Dimensions (B × T)	1.2 × 4.0 mm (0.0472 × 0.1575 in)	----
End gap (installed)	0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in)	0.80 mm (0.0315 in)
Side clearance	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)	0.13 mm (0.0051 in)

Item	Standard	Limit
Oil ring  		
Dimensions (B × T)	2.5 × 3.4 mm (0.0984 × 0.1339 in)	----
End gap (installed)	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in)	----
Side clearance	0.06 ~ 0.15 mm (0.0024 ~ 0.0059 in)	----
Crankshaft  		
Crank width “A”	74.95 ~ 75.00 mm (2.9508 ~ 2.9528 in)	----
Runout limit C1	----	0.03 mm (0.0012 in)
C2	----	0.03 mm (0.0012 in)
Big end side clearance “D”	0.35 ~ 0.65 mm (0.0138 ~ 0.0256 in)	1.0 mm (0.0394 in)
Big end radial clearance “E”	0.010 ~ 0.025 mm (0.0004 ~ 0.0010 in)	----
Balancer		
Balancer drive method	Gear	----
Automatic centrifugal clutch		
Clutch shoe thickness	1.5 mm (0.06 in)	1.0 mm (0.04 in)
Clutch-in revolution	1,900 ~ 2,300 r/min	----
Clutch-stall revolution	3,350 ~ 3,850 r/min	----

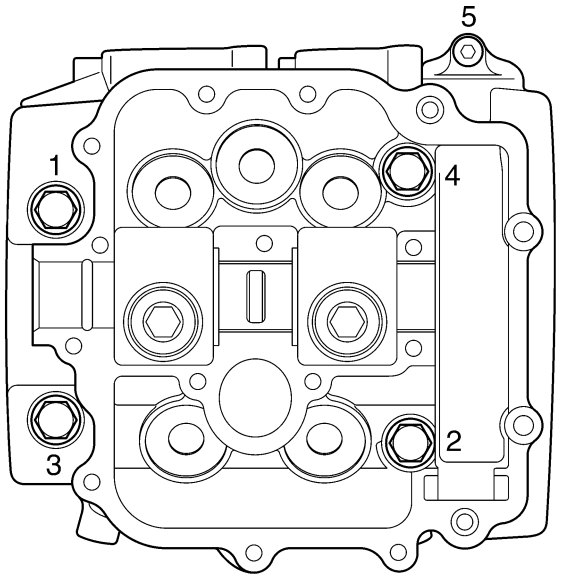
Item		Standard	Limit
Transmission			
Main axle deflection limit		----	0.06 mm (0.0024 in)
Drive axle deflection limit		----	0.06 mm (0.0024 in)
Shifter			
Shifter type		Shift drum and guide bar	----
Air filter oil grade		Engine oil	----
Carburetor			
I. D. mark		5UG1 00	----
Main jet	(M.J)	#150	----
Main air jet	(M.A.J)	#70	----
Jet needle	(J.N)	6JPH9-53-2	----
Needle jet	(N.J)	O-0M	----
Pilot air jet	(P.A.J.1)	#60	----
Pilot air jet	(P.A.J.2)	1.5	----
Pilot outlet	(P.O)	1.1	----
Pilot jet	(P.J)	#40	----
Bypass 1	(B.P.1)	0.8	----
Bypass 2	(B.P.2)	0.8	----
Bypass 3	(B.P.3)	0.8	----
Valve seat size	(V.S)	2.3	----
Starter jet	(G.S.1)	#55	----
Starter jet	(G.S.2)	0.8	----
Throttle valve size	(Th.V)	#105	----
Float height	(F.H)	13 mm (0.51 in)	----
Fuel level	(F.L)	4.0 ~ 5.0 mm (0.16 ~ 0.20 in)	----
Engine idle speed		1,450 ~ 1,550 r/min	----
Intake vacuum		28.0 ~ 30.7 kPa (210 ~ 230 mmHg, 8.27 ~ 9.06 inHg)	----
Oil pump			
Oil filter type		Foam	----
Oil pump type		Trochoid	----
Tip clearance		0.15 mm (0.0059 in)	0.23 mm (0.0091 in)
Side clearance		0.03 ~ 0.10 mm (0.0012 ~ 0.0039 in)	0.17 mm (0.0067 in)
Body clearance		0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in)	0.24 mm (0.0094 in)
Bypass valve setting pressure		441.0 ~ 637.0 kPa ($4.41 \sim 6.37$ kg/cm^2, 62.7 ~ 90.6 psi)	----
Oil pressure (hot)		65 kPa (0.65 kg/cm^2, 9.2 psi) at 1,500 r/min	----
Pressure check location		Cylinder head	----

Item	Standard	Limit
Cooling system		
Radiator core		
Width	380 mm (14.96 in)	----
Height	238 mm (9.37 in)	----
Thickness	24 mm (0.94 in)	----
Radiator cap opening pressure	107.9 ~ 137.3 kPa (1.079 ~ 1.373 kg/cm^2, 15.35 ~ 19.53 psi)	----
Radiator capacity (including all routes)	2.5 L (2.20 Imp qt, 2.64 US qt)	----
Coolant reservoir		
Capacity	0.35 L (0.31 Imp qt, 0.37 US qt)	----
From low to full level	0.20 L (0.15 Imp qt, 0.21 US qt)	----
Water pump		
Type	Single-suction centrifugal pump	----
Reduction ratio	32/31 (1.032)	
Shaft drive		
Middle gear backlash	0.1 ~ 0.3 mm (0.004 ~ 0.012 in)	----
Final gear backlash	0.1 ~ 0.3 mm (0.004 ~ 0.012 in)	----
Differential gear backlash	0.05 ~ 0.25 mm (0.002 ~ 0.010 in)	----

Lubrication chart



Cylinder head tightening sequence



CHASSIS SPECIFICATIONS

Item		Standard	Limit
Steering system			
Type		Rack and pinion	----
Front suspension			
Shock absorber travel		108 mm (4.25 in)	----
Spring free length		313 mm (12.32 in)	----
Spring fitting length		247.9 mm (9.76 in)	----
Spring rate	(K1)	19.4 N/mm (1.94 kg/mm, 108.6 lb/in)	----
Stroke	(K1)	0 ~ 108 mm (0 ~ 4.25 in)	----
Optional spring		No	----
Rear suspension			
Shock absorber travel		81 mm (3.19 in)	----
Spring free length		328 mm (12.91 in)	----
Spring fitting length		273.2 mm (10.76 in)	----
Spring rate	(K1)	44.1 N/mm (4.41 kg/mm, 246.95 lb/in)	----
	(K2)	117.7 N/mm (11.77 kg/mm, 659.08 lb/in)	----
Stroke	(K1)	0 ~ 60 mm (0 ~ 2.36 in)	----
	(K2)	60 ~ 81 mm (2.36 ~ 3.15 in)	----
Optional spring		No	----
Front wheel			
Type		Panel wheel	----
Rim size		12 × 6.0 AT	----
Rim material		Steel	----
Rim runout limit	radial	----	2.0 mm (0.08 in)
	lateral	----	2.0 mm (0.08 in)
Rear wheel			
Type		Panel wheel	----
Rim size		12 × 7.5 AT	----
Rim material		Steel	----
Rim runout limit	radial	----	2.0 mm (0.08 in)
	lateral	----	2.0 mm (0.08 in)

Item	Standard	Limit
Front disc brake		
Type	Dual	----
Disc outside diameter × thickness	200 × 3.5 mm (7.87 × 0.14 in)	----
Pad thickness inner	5.2 mm (0.20 in)	1.5 mm (0.06 in)
Pad thickness outer	5.2 mm (0.20 in)	1.5 mm (0.06 in)
Master cylinder inside diameter	17.4 mm (0.69 in)	----
Caliper cylinder inside diameter	27.0 mm (1.06 in)	----
Brake fluid type	DOT 4	----
Rear disc brake		
Type	Single	----
Disc outside diameter × thickness	165.0 × 5.0 mm (6.50 × 0.20 in)	----
Pad thickness inner	5.6 mm (0.22 in)	1.5 mm (0.06 in)
Pad thickness outer	5.6 mm (0.22 in)	1.5 mm (0.06 in)
Master cylinder inside diameter	17.4 mm (0.69 in)	----
Caliper cylinder inside diameter	32.0 mm (1.26 in)	----
Brake fluid type	DOT 4	----
Brake lever and brake pedal		
Accelerator pedal free play	0 mm (0.0 in)	----
Brake pedal free play	0 mm (0.0 in)	----
Parking brake cable free play	2 ~ 3 mm (0.079 ~ 0.118 in)	----

ELECTRICAL SPECIFICATIONS

Item	Standard	Limit
Voltage	12 V	----
Ignition system		
Ignition timing (BTDC)	12°/ 1,500 r/min	----
Advancer type	Digital type	----
C.D.I.		
Magneto model/manufacturer	F4T46972/MITSUBISHI	----
Pickup coil resistance/color	459 ~ 561 Ω at 20 °C (68 °F)/ White/Red – White/Green	----
Rotor rotation direction sensing coil resistance/color	0.063 ~ 0.077 Ω at 20 °C (68 °F)/ Red – White/Blue	----
C.D.I. unit model/manufacturer	F8T38681/MITSUBISHI	----
Ignition coil		
Model/manufacturer	2JN/YAMAHA	----
Minimum spark gap	6 mm (0.24 in)	----
Primary winding resistance	0.18 ~ 0.28 Ω at 20 °C (68 °F)	----
Secondary winding resistance	6.32 ~ 9.48 kΩ at 20 °C (68 °F)	----
Spark plug cap		
Type	Resin type	----
Resistance	10 kΩ	----
Charging system		
Type	A.C. magneto generator	----
Model/manufacturer	F4T46972/MITSUBISHI	----
Nominal output	14 V 23 A at 5,000 r/min	----
Charging coil resistance/color	0.32 ~ 0.43 Ω at 20 °C (68 °F)/ White – White	----
Rectifier/regulator		
Regulator type	Semi conductor-short circuit	----
Model/manufacturer	SH650D-11/SHINDENGEN	----
No load regulated voltage (DC)	14.1 ~ 14.9 V	----
Capacity	18 A	----
Withstand voltage	200 V	----
Battery		
Specific gravity	1.32	----

Item	Standard	Limit
Electric starter system		
Type	Constant mesh type	----
Starter motor		
Model/manufacturer	SM-13/MITSUBA	----
Output	0.8 kW	----
Armature coil resistance	0.025 ~ 0.035 Ω at 20 °C (68 °F)	----
Brush overall length	12.5 mm (0.49 in)	5 mm (0.20 in)
Spring force	7.65 ~ 10.01 N (780 ~ 1,021 g, 27.5 ~ 36.0 oz)	----
Commutator diameter	28 mm (1.10 in)	27 mm (1.06 in)
Mica undercut	0.7 mm (0.03 in)	----
Starter relay		
Model/manufacturer	MS5F-561/JIDECO	----
Amperage rating	180 A	----
Coil winding resistance	4.18 ~ 4.62 Ω at 20 °C (68 °F)	----
Radiator fan		
Running rpm	2,950 r/min	----
Thermo switch		
Thermo switch 1		
Model/manufacturer	4BA/DENSO	----
Thermo switch 2		
Model/manufacturer	5FU/NIPPON THERMOSTAT	----
Thermo switch 3		
Model/manufacturer	5GM/NIPPON THERMOSTAT	----
Circuit breaker		
Type	Fuse	----
Amperage for individual circuit		
Main fuse	30 A × 1	----
Lighting system fuse	15 A × 1	----
Ignition fuse	10 A × 1	----
Auxiliary DC jack fuse	10 A × 1	----
Four-wheel drive fuse	3 A × 1	----
Signaling system fuse	10 A × 1	----
Carburetor heater fuse	10 A × 1	----
Backup fuse (odometer)	10 A × 1	----
Reserve	30 A × 1	----
Reserve	15 A × 1	----
Reserve	10 A × 1	----
Reserve	3 A × 1	----

EBS01005

TIGHTENING TORQUES

ENGINE TIGHTENING TORQUES

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Cylinder head	Bolt	M6	1	10	1.0	7.2	
	Bolt	M9	6	38	3.8	27	
Spark plug	—	M12	1	18	1.8	13	
Cylinder head (exhaust pipe)	Stud bolt	M8	4	15	1.5	11	
Cylinder head cover	Bolt	M6	17	10	1.0	7.2	
Tappet cover (exhaust)	—	M32	2	12	1.2	8.7	
Tappet cover (intake)	Bolt	M6	4	10	1.0	7.2	
Oil gallery bolt	—	M6	1	7	0.7	5.1	
Camshaft end cap	Bolt	M6	1	10	1.0	7.2	
Cylinder	Bolt	M6	2	10	1.0	7.2	
	Bolt	M10	4	42	4.2	30	
Balancer driven gear	Nut	M18	1	110	11.0	80	M
Timing chain tensioner	Bolt	M6	2	10	1.0	7.2	
Timing chain tensioner cap	Bolt	M6	1	7	0.7	5.1	
Timing chain guide (intake side)	Bolt	M6	2	8	0.8	5.8	
Camshaft sprocket	Bolt	M7	2	20	2.0	14	
Rocker arm shaft stopper	Bolt	M6	2	10	1.0	7.2	
Valve adjusting locknut	—	M6	5	14	1.4	10	
Engine oil drain bolt	—	M14	1	30	3.0	22	
Oil filter cartridge union bolt	—	M20	1	63	6.3	46	
Oil filter cartridge	—	M20	1	17	1.7	12	E
Oil pipe assembly	Bolt	M6	4	7	0.7	5.1	
Oil delivery pipe 1	Union bolt	M8	2	18	1.8	13	
Oil delivery pipe 2	Union bolt	M14	1	35	3.5	25	
Oil delivery pipe 3	Union bolt	M10	1	20	2.0	14	
Oil delivery pipe 2 and oil delivery pipe 3	Union bolt	M14	1	35	3.5	25	
Relief valve assembly plate	Bolt	M6	2	10	1.0	7.2	
Oil strainer	Bolt	M6	1	10	1.0	7.2	
Oil pump assembly	Bolt	M6	3	10	1.0	7.2	
Oil cooler inlet pipe 1/oil cooler outlet pipe 1	Bolt	M6	2	7	0.7	5.1	
Oil cooler inlet pipe 1/oil cooler outlet pipe 1 clamp	Bolt	M6	1	7	0.7	5.1	
Oil cooler inlet pipe 2/oil cooler outlet pipe 2 clamp	Bolt	M6	2	7	0.7	5.1	
Intake manifold	Bolt	M6	4	10	1.0	7.2	
Carburetor joint (intake manifold) screw clamp	—	M5	1	3	0.3	2.1	
Intake manifold screw clamp	—	M5	1	3	0.3	2.1	

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Crankcase	Bolt	M8	3	26	2.6	19	
	Bolt	M6	14	10	1.0	7.2	
	Bolt	M6	1	10	1.0	7.2	Sealant (Quick Gasket®) Yamaha bond No.1215
Bearing housing (clutch housing assembly)	Bolt	M6	4	10	1.0	7.2	
Air duct assembly 1 bracket	Bolt	M6	2	14	1.4	10	
Oil seal (engine cooling fan pulley) retainer	Bolt	M5	2	7	0.7	5.1	
Drive belt case	Bolt	M6	9	10	1.0	7.2	
Drive belt cover	Bolt	M6	14	10	1.0	7.2	
Engine cooling fan	Bolt	M6	2	7	0.7	5.1	
Air shroud 1 and air shroud 2	Bolt	M6	4	10	1.0	7.2	
Air shroud 2 and A.C. magneto cover	Bolt	M6	4	10	1.0	7.2	
Engine cooling fan pulley	Bolt	M10	1	55	5.5	40	
Engine cooling fan air duct assembly	Bolt	M6	1	7	0.7	5.1	
Stator assembly	Screw	M6	3	7	0.7	5.1	
Pickup coil	Bolt	M5	2	7	0.7	5.1	
Stator lead holder	Bolt	M6	2	10	1.0	7.2	
A.C. magneto cover	Bolt	M6	12	10	1.0	7.2	
			1	10	1.0	7.2	Sealant (Quick Gasket®) Yamaha bond No.1215
Starter clutch	Bolt	M8	3	30	3.0	22	
Clutch carrier assembly	Nut	M22	1	160	16.0	115	Stake
Clutch housing assembly	Bolt	M6	9	10	1.0	7.2	
Bearing retainer (middle drive shaft)	Screw	M8	4	29	2.9	21	
Middle drive pinion gear	Nut	M22	1	145	14.5	105	Stake
Middle drive shaft bearing housing	Bolt	M8	4	32	3.2	23	
Middle driven pinion gear bearing retainer	Nut	M60	1	110	11.0	80	Left-hand threads
Universal joint yoke and middle driven pinion gear	Nut	M16	1	150	15.0	110	
Middle driven pinion gear bearing housing	Bolt	M8	4	25	2.5	18	
Drive shaft coupling and middle driven shaft	Nut	M14	1	97	9.7	70	
Middle driven shaft bearing retainer	Nut	M55	1	80	8.0	58	Left-hand threads

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Primary sheave assembly	Nut	M16	1	120	12.0	85	
Primary pulley sheave cap	Screw	M4	8	3	0.3	2.2	
Secondary sheave assembly	Nut	M16	1	100	10.0	72	
Secondary sheave spring retainer	Nut	M36	1	90	9.0	65	
Shift lever cover	Bolt	M6	4	10	1.0	7.2	
Shift lever 2 assembly	Bolt	M6	1	14	1.4	10	
Shift drum stopper	Bolt	M14	1	18	1.8	13	
Shift arm	Bolt	M6	1	14	1.4	10	
Shift rod locknut (select lever unit side)	—	M8	1	15	1.5	11	
Shift rod locknut (shift arm side)	—	M8	1	15	1.5	11	Left-hand threads
Select lever unit	Bolt	M8	3	15	1.5	11	
Plug (right crankcase)	—	M14	1	18	1.8	13	
Water pump assembly	Bolt	M6	2	10	1.0	7.2	
Water pump housing cover	Bolt	M6	2	12	1.2	8.7	
Coolant drain bolt	—	M6	1	10	1.0	7.2	
Coolant inlet joint	Bolt	M6	2	10	1.0	7.2	
Coolant outlet joint	Bolt	M6	2	10	1.0	7.2	
Air bleed bolt (coolant outlet joint)	—	M6	1	9	0.9	6.5	
Coolant reservoir	Bolt	M6	2	7	0.7	5.1	
Radiator bracket and frame	Bolt	M6	4	7	0.7	5.1	
Fuel pump	Bolt	M6	2	7	0.7	5.1	
Fuel tank	Bolt	M8	2	30	3.0	22	
Muffler stay	Bolt	M6	2	11	1.1	8.0	
Muffler and exhaust pipe	Bolt	M8	1	20	2.0	14	
Muffler bracket and muffler	Bolt	M8	1	20	2.0	14	
Muffler bracket and frame	Bolt	M8	2	20	2.0	14	
Muffler damper and muffler	Bolt	M6	1	10	1.0	7.2	
Muffler damper and frame	Bolt	M6	1	10	1.0	7.2	
Exhaust pipe	Nut	M8	4	14	1.4	10	
Air duct assembly 1	Bolt	M6	2	7	0.7	5.1	
Air duct assembly 2 and left protector	Bolt	M6	1	7	0.7	5.1	
Air duct assembly 2 and frame	Bolt	M6	1	7	0.7	5.1	
Gear position switch	Bolt	M5	2	7	0.7	5.1	
Thermo switch 1 (cylinder head)	—	1/8	1	8	0.8	5.8	
Thermo switch 3 (radiator)	—	M18	1	28	2.8	20	
Reverse switch	—	M10	1	20	2.0	14	
Engine ground lead	Bolt	M6	1	10	1.0	7.2	
Starter motor and engine	Bolt	M6	2	10	1.0	7.2	
Speed sensor	Bolt	M6	1	10	1.0	7.2	

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CHASSIS TIGHTENING TORQUES

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Rubber damper and frame	M10	52	5.2	37	
Engine and rubber damper (front)	M10	52	5.2	37	
	M6	10	1.0	7.2	
Engine bracket and rubber damper (rear)	M8	33	3.3	24	
	M6	10	1.0	7.2	
Rear upper arm and frame	M10	45	4.5	32	
Rear lower arm and frame	M10	45	4.5	32	
Rear knuckle and rear upper arm	M10	45	4.5	32	
Rear knuckle and rear lower arm	M10	45	4.5	32	
Rear shock absorber and frame	M10	45	4.5	32	
Rear shock absorber and rear lower arm	M10	45	4.5	32	
Stabilizer and frame	M8	32	3.2	23	
Stabilizer joint and stabilizer	M10	56	5.6	40	
Stabilizer joint and rear lower arm	M10	56	5.6	40	
Differential gear case and frame	M10	55	5.5	40	
Differential gear case filler plug	M14	23	2.3	17	
Differential gear case drain plug	M10	10	1.0	7.2	
Universal joint yoke and drive pinion gear	M14	62	6.2	45	
Gear motor and differential gear case cover	M8	13	1.3	9.4	
Differential gear case cover and differential gear case	M8	25	2.5	18	
Final drive gear case and frame	M10	70	7.0	51	
Final drive gear case filler plug	M20	23	2.3	17	
Final drive gear case drain plug	M10	20	2.0	14	
Ring gear bearing housing and final drive gear case	M8	23	2.3	17	
	M10	40	4.0	29	
Ring gear stopper nut	M8	16	1.6	11	
Bearing retainer and final gear pinion gear bearing housing	M65	170	17.0	125	Left-hand threads
Coupling gear and final drive pinion gear	M12	80	8.0	58	
Front upper arm and frame	M10	45	4.5	32	
Front lower arm and frame	M10	45	4.5	32	
Front shock absorber and frame	M10	45	4.5	32	
Front shock absorber and front upper arm	M10	45	4.5	32	
Steering shaft assembly and steering joint	M8	22	2.2	16	
Steering assembly and steering joint	M8	22	2.2	16	
Steering assembly and frame	M10	48	4.8	35	
Steering shaft assembly and frame	M8	21	2.1	15	
Steering wheel and steering shaft assembly	M12	35	3.5	25	
Steering knuckle and front upper arm	M12	30	3.0	22	

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Steering knuckle and front lower arm	M12	30	3.0	22	
Tie-rod locknut	M12	40	4.0	29	
Steering knuckle and tie-rod	M12	39	3.9	28	
Front arm protector and front lower arm	M6	7	0.7	5.1	
Seat belt and frame	M10	59	5.9	43	
Seat belt and side frame (enclosure)	7/16	59	5.9	43	
Front wheel and front wheel hub	M10	55	5.5	40	
Front wheel hub and constant velocity joint	M20	260	26.0	190	Stake
Steering knuckle and brake disc guard	M6	7	0.7	5.1	
Front brake caliper and front wheel hub	M10	48	4.8	35	
Front brake hose union bolt	M10	27	2.7	19	
Front brake hose holder and steering knuckle	M6	7	0.7	5.1	
Front brake hose holder and front upper arm	M6	7	0.7	5.1	
Front brake hose and frame	M6	7	0.7	5.1	
Front brake hose holder and frame	M6	7	0.7	5.1	
Front brake pad holding bolt	M8	18	1.8	13	
Front brake disc and front wheel hub	M8	30	3.0	22	
Front brake caliper bleed screw	M6	6	0.6	4.3	
Rear wheel and rear wheel hub	M10	55	5.5	40	
Rear wheel hub and constant velocity joint	M20	260	26.0	190	Stake
Rear brake hose and frame	M6	7	0.7	5.1	
Brake pipe and brake master cylinder	M10	19	1.9	13	
Brake pipe and rear brake hose	M10	19	1.9	13	
Pedal assembly and frame	M8	16	1.6	11	
Brake master cylinder and pedal assembly	M8	16	1.6	11	
Secondary brake master cylinder kit stopper bolt	M6	9	0.9	6.5	
Brake rod locknut	M8	17	1.7	12	
Rear brake disc and brake disc boss	M6	10	1.0	7.2	
Rear brake pad holding bolt	M8	17	1.7	12	
Rear brake caliper and final drive pinion gear bearing housing	M10	40	4.0	29	
Rear brake hose union bolt	M10	27	2.7	19	
Parking brake case and rear brake caliper	M8	22	2.2	16	
Parking brake lever assembly and frame	M6	7	0.7	5.1	
Rear brake caliper bleed screw	M6	5	0.5	3.6	
Cargo bed latch and frame	M10	64	6.4	46	
Cargo bed release lever	M6	11	1.1	8.0	
	M8	26	2.6	19	
Damper and cargo bed assembly	M8	16	1.6	11	
Hinge cover and cargo bed assembly	—	7	0.7	5.1	
Cargo bed panel and cargo bed assembly	M6	7	0.7	5.1	
Mud guard and cargo bed assembly	M6	7	0.7	5.1	
Front bumper protector and front bumper	M6	7	0.7	5.1	

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Front bumper and frame	M10	32	3.2	23	
	M12	59	5.9	43	
Hood stopper and frame	M8	16	1.6	11	
Upper instrument panel and frame	M6	7	0.7	5.1	
Side frame (enclosure) and frame	M10	64	6.4	46	
Support frame (enclosure) and frame	M10	64	6.4	46	
Left support frame (enclosure) and right support frame (enclosure)	M10	64	6.4	46	
Support frame (enclosure) and side frame (enclosure)	M10	64	6.4	46	
Top frame (enclosure) and side frame (enclosure)	M10	64	6.4	46	
Seat support and frame	M8	16	1.6	11	
Select lever bracket and seat support	M10	32	3.2	23	
Skid plate and frame	M6	7	0.7	5.1	

EBS00022

HOW TO USE THE CONVERSION TABLE

All specification data in this manual are listed in SI and METRIC UNITS.
Use this table to convert METRIC unit data to IMPERIAL unit data.

Ex.

METRIC		MULTIPLIER		IMPERIAL
** mm	×	0.03937	=	** in
2 mm	×	0.03937	=	0.08 in

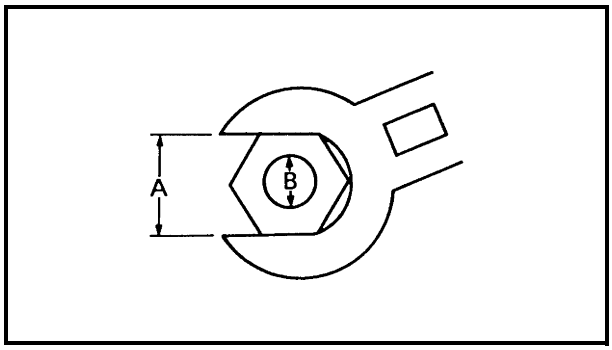
CONVERSION TABLE

METRIC TO IMPERIAL			
	Metric unit	Multiplier	Imperial unit
Torque	m · kg m · kg cm · kg cm · kg	7.233 86.794 0.0723 0.8679	ft · lb in · lb ft · lb in · lb
Weight	kg g	2.205 0.03527	lb oz
Speed	km/hr	0.6214	mph
Distance	km m m cm mm	0.6214 3.281 1.094 0.3937 0.03937	mi ft yd in in
Volume/ Capacity	cc (cm^3) cc (cm^3) lt (liter) lt (liter)	0.03527 0.06102 0.8799 0.2199	oz (IMP liq.) cu · in qt (IMP liq.) gal (IMP liq.)
Misc.	kg/mm kg/cm^2 Centigrade (°C)	55.997 14.2234 9/5+32	lb/in psi (lb/in^2) Fahrenheit (°F)

EBS00023

GENERAL TIGHTENING TORQUE SPECIFICATIONS

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided for each chapter of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross pattern and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.



A: Distance between flats
B: Outside thread diameter

A (nut)	B (bolt)	General tightening torques		
		Nm	m · kg	ft · lb
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94

EBS00024

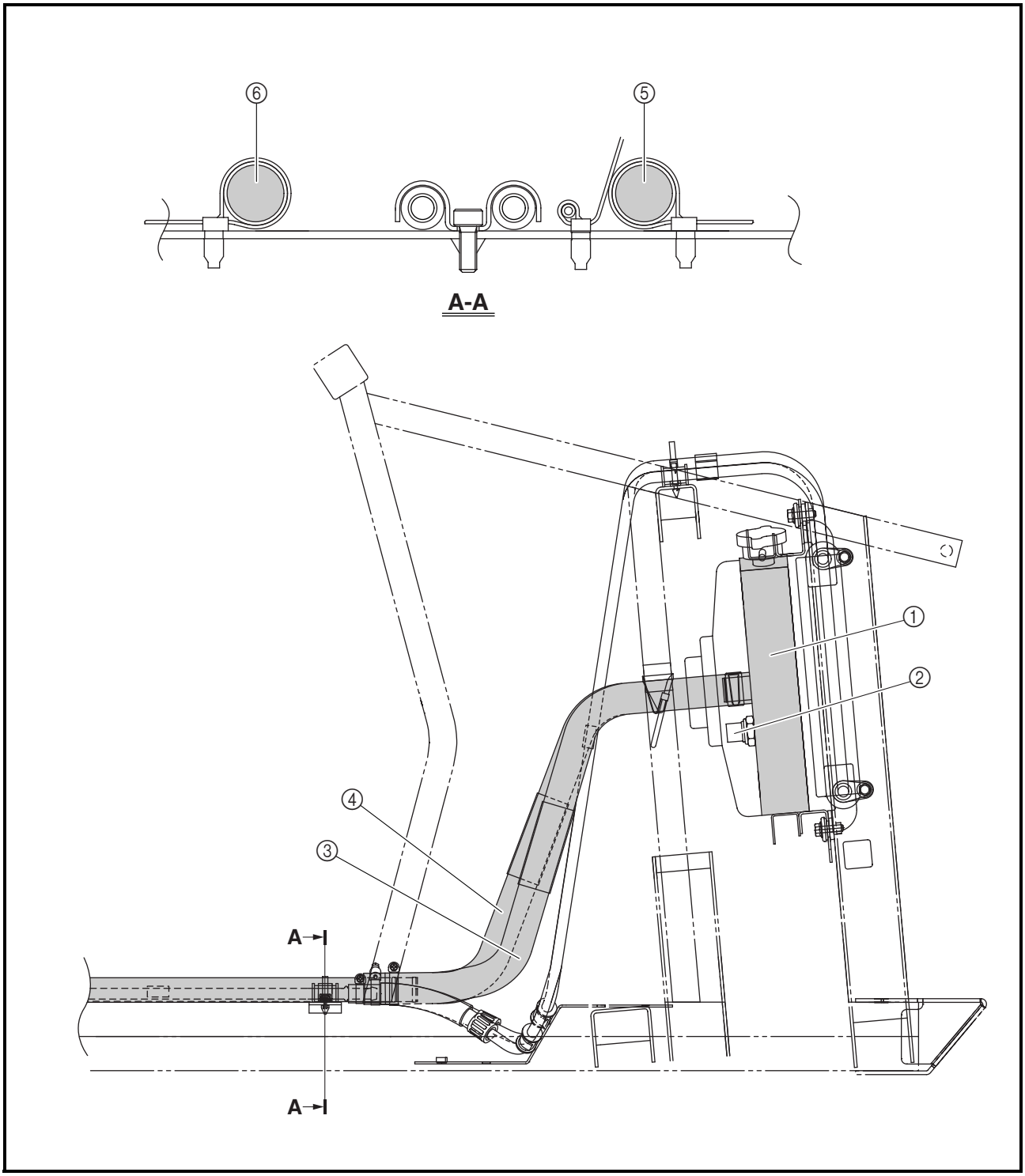
LUBRICATION POINTS AND LUBRICANT TYPES

ENGINE

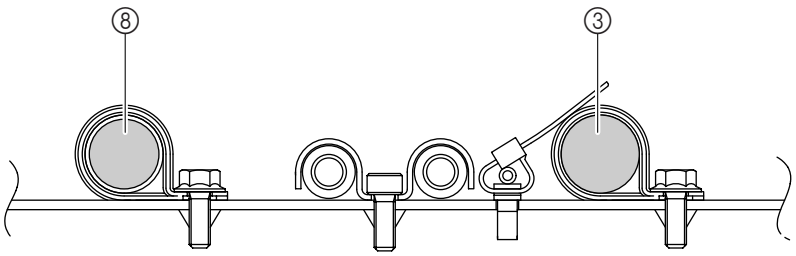
Lubrication points	Lubricant
Oil seal lips	LS
Bearings	E
O-rings	LS
Piston, piston ring	E
Piston pin	E
Buffer boss and balancer drive gear	E
Crankshaft seal and spacer	E
Valve stem	M
Valve stem end	M
Rocker arm shaft	E
Rocker arm	M
Camshaft lobe and journal	M
Oil pump assembly	E
Oil filter cartridge O-ring	LS
Starter idle gear shaft	M
Starter wheel gear	E
Clutch housing assembly shaft end	LS
Clutch carrier assembly	E
One-way clutch bearing	M
Middle driven shaft splines	M
Drive axle, driven sprocket, high wheel gear, and low wheel gear	M
Middle drive gear and clutch dog shift fork groove	M
Driven chain/sprocket	E
Shift drum	E
Shift fork guide bar	E
Shift drum stopper ball	E
Shift lever 2 assembly	LS
Shift lever 1	E
Shift lever 1 and shift lever 2 assembly mating surface	E
Crankcase mating surface	Sealant (Quick Gasket®) Yamaha Bond No.1215
A.C. magneto lead grommet	Sealant (Quick Gasket®) Yamaha Bond No.1215

COOLANT FLOW DIAGRAMS

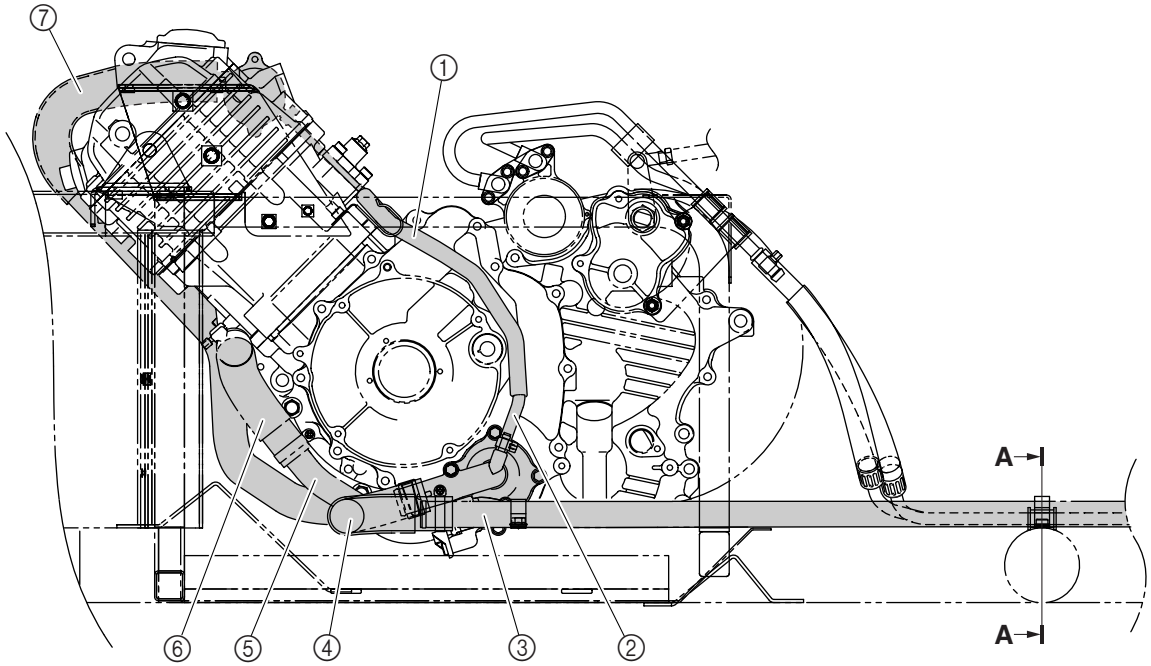
① Radiator
② Thermo switch 3
③ Radiator outlet hose
④ Radiator inlet hose
⑤ Radiator outlet pipe
⑥ Radiator inlet pipe



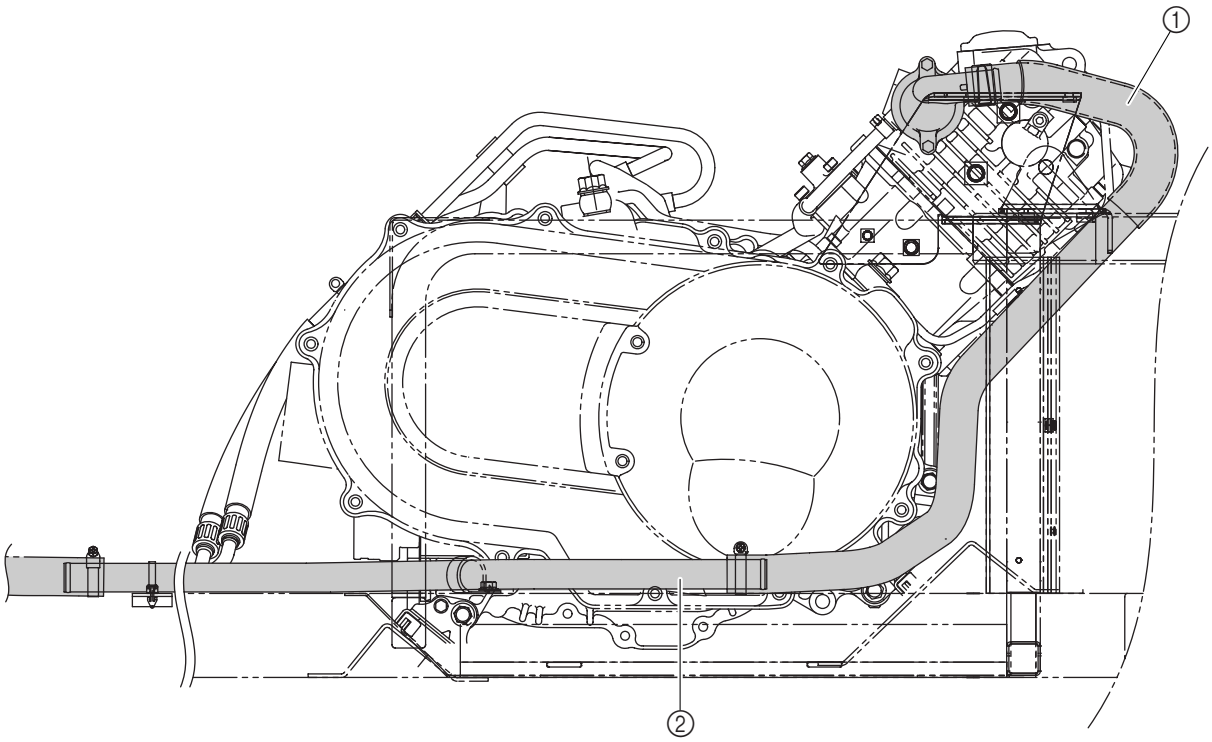
① Coolant breather hose
② Coolant breather pipe
③ Radiator outlet pipe
④ Water pump inlet hose
⑤ Water pump outlet pipe
⑥ Water pump outlet hose
⑦ Coolant outlet hose
⑧ Radiator inlet pipe



A-A

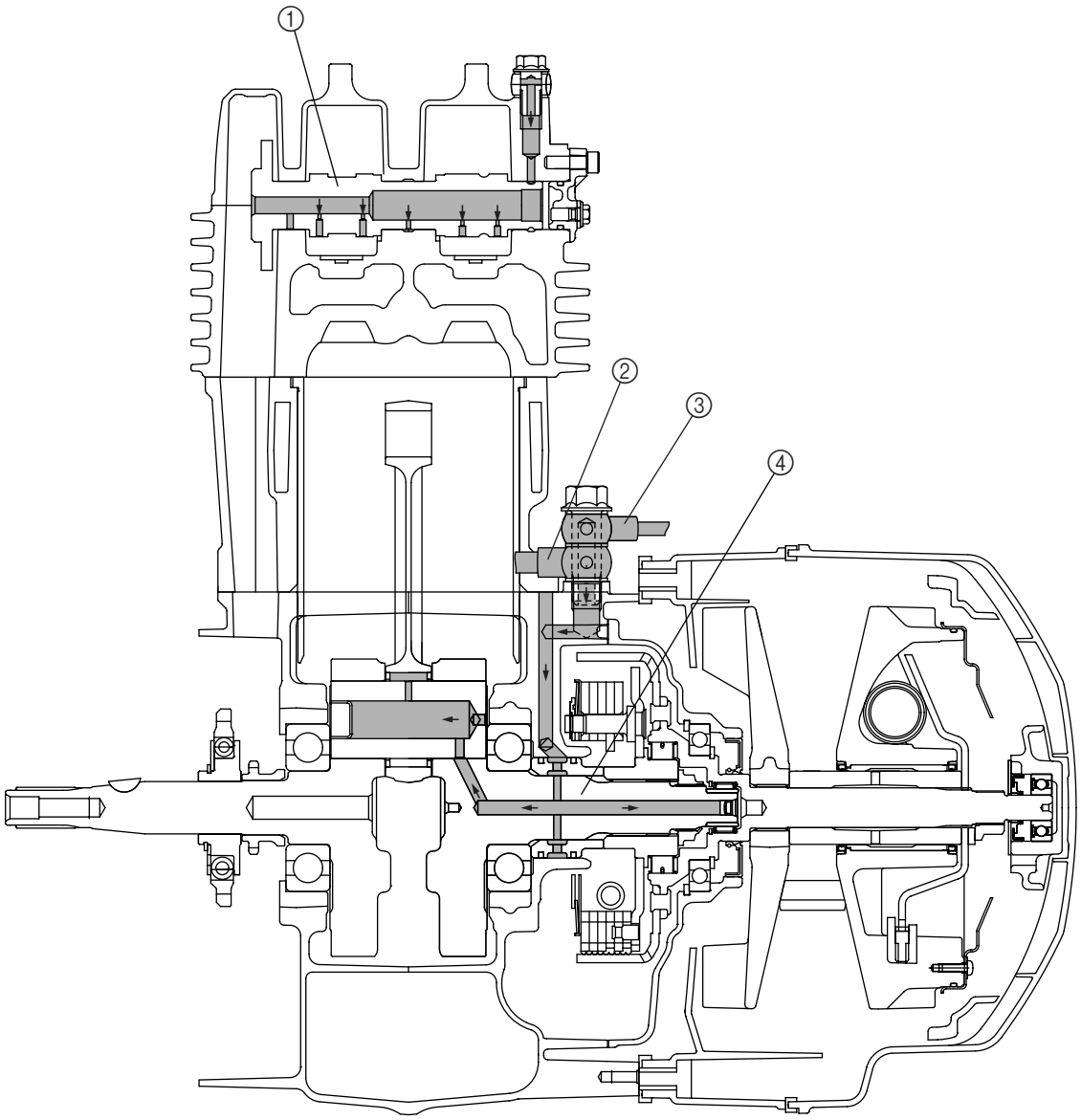


① Coolant outlet hose
② Radiator inlet pipe

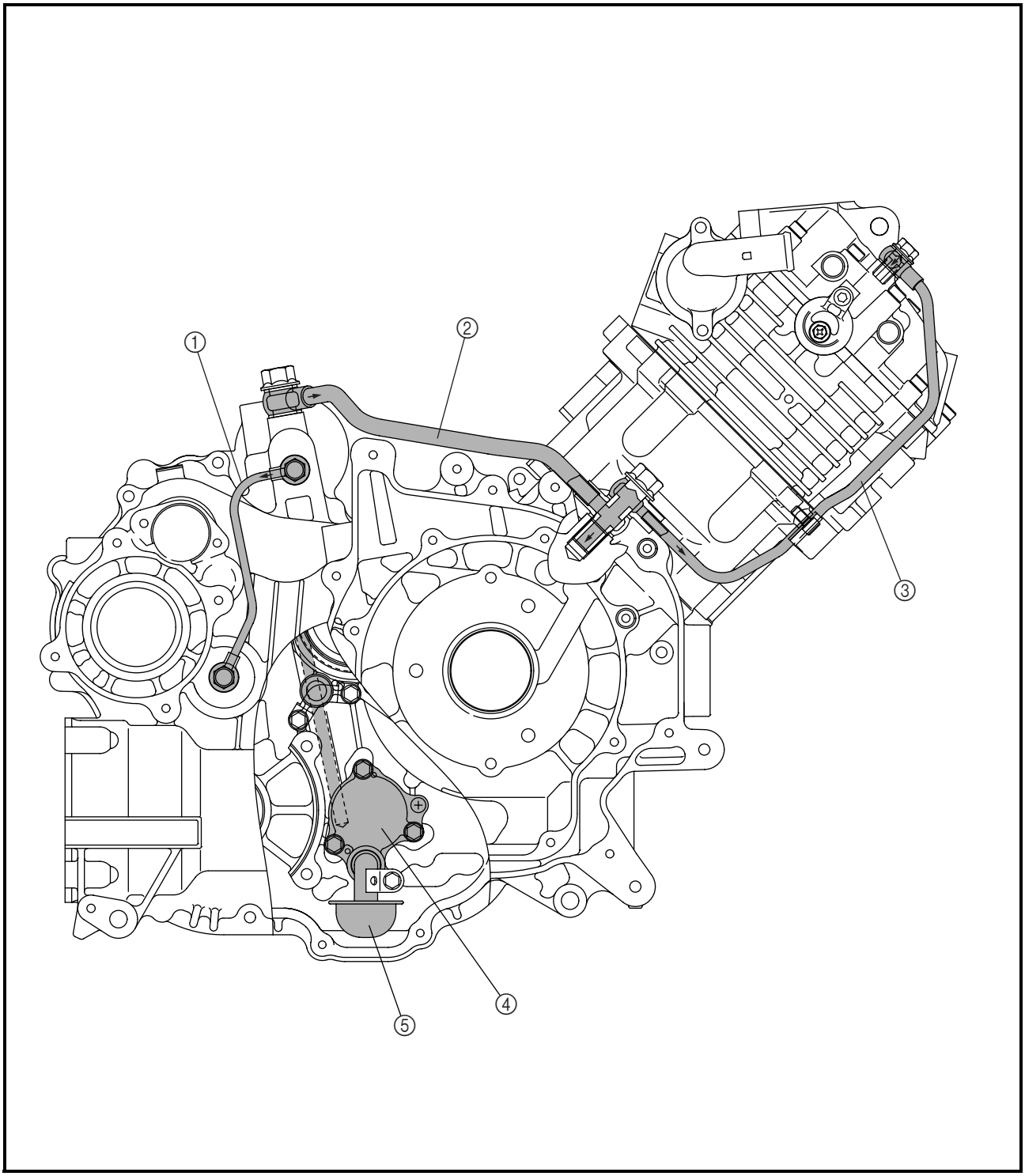


OIL FLOW DIAGRAMS

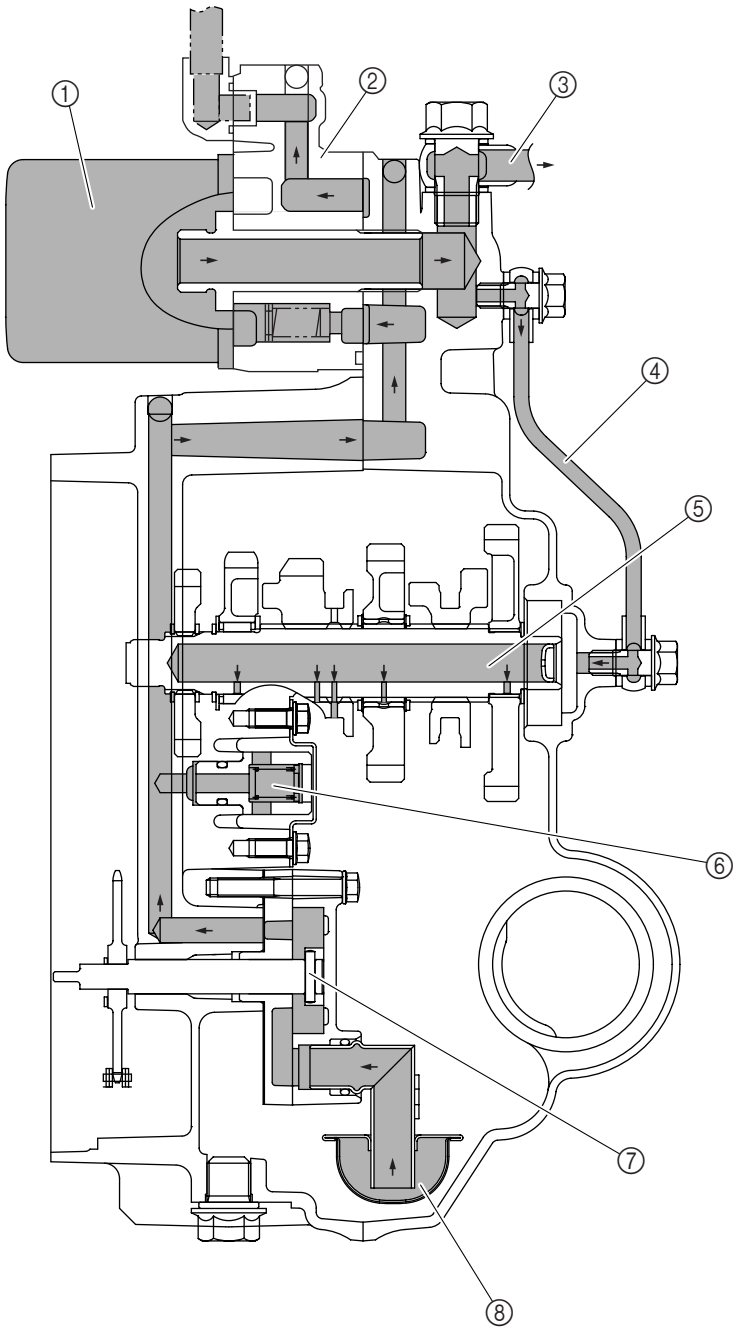
① Camshaft
② Oil delivery pipe 2
③ Oil delivery pipe 3
④ Crankshaft



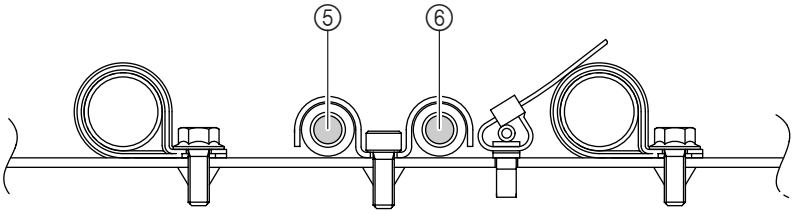
① Oil delivery pipe 1
② Oil delivery pipe 2
③ Oil delivery pipe 3
④ Oil pump
⑤ Oil strainer



① Oil filter cartridge
② Oil pipe adapter
③ Oil delivery pipe 2
④ Oil delivery pipe 1
⑤ Drive axle
⑥ Relief valve
⑦ Oil pump
⑧ Oil strainer



① Oil outlet pipe
② Oil inlet pipe
③ Oil outlet hose
④ Oil inlet hose
⑤ Oil cooler inlet pipe 2
⑥ Oil cooler outlet pipe 2



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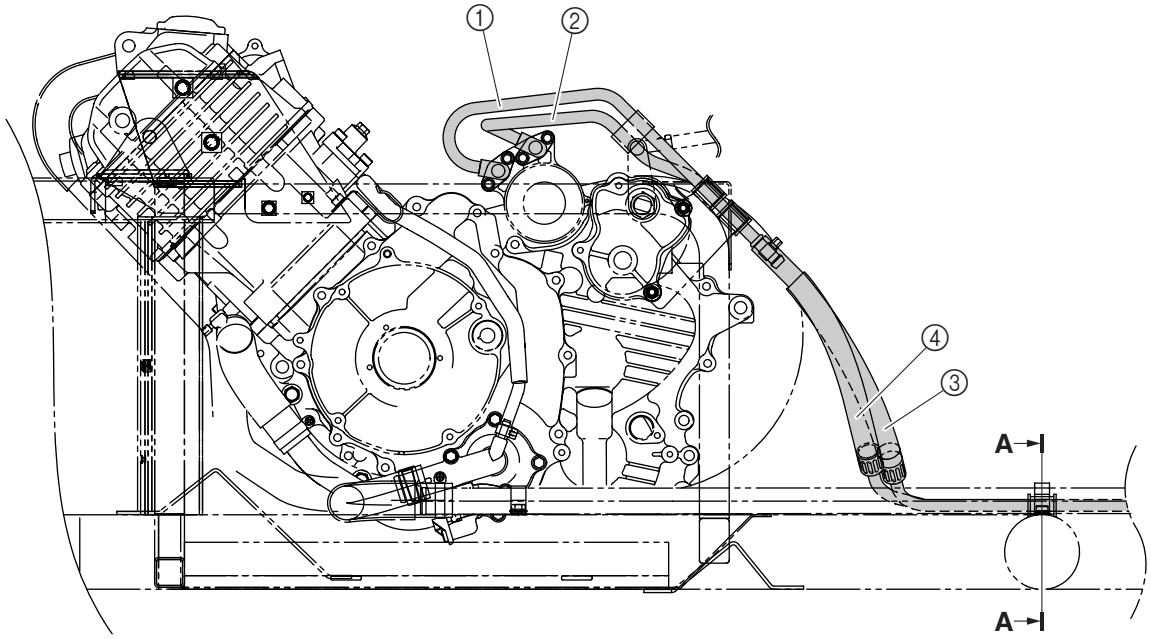
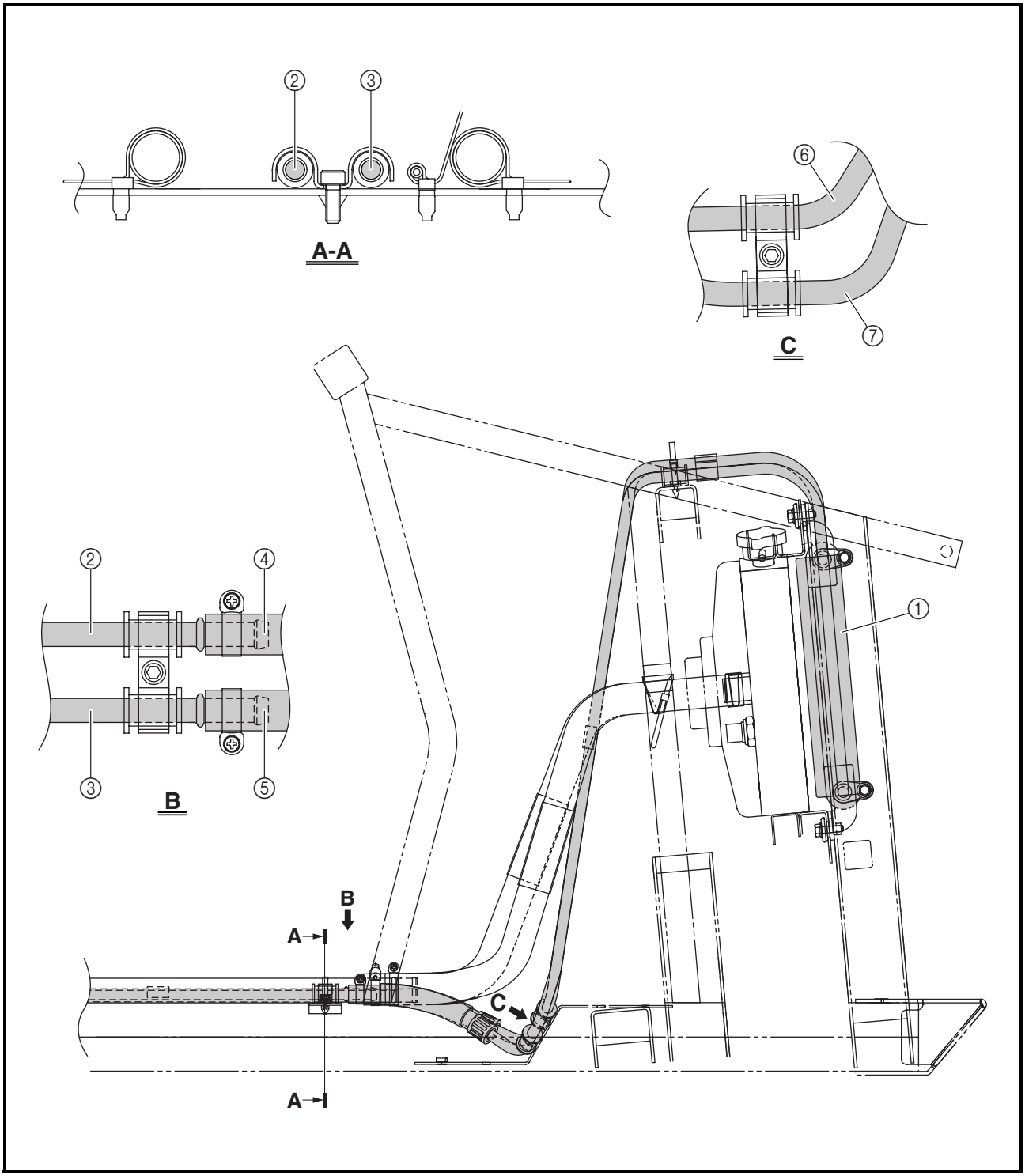
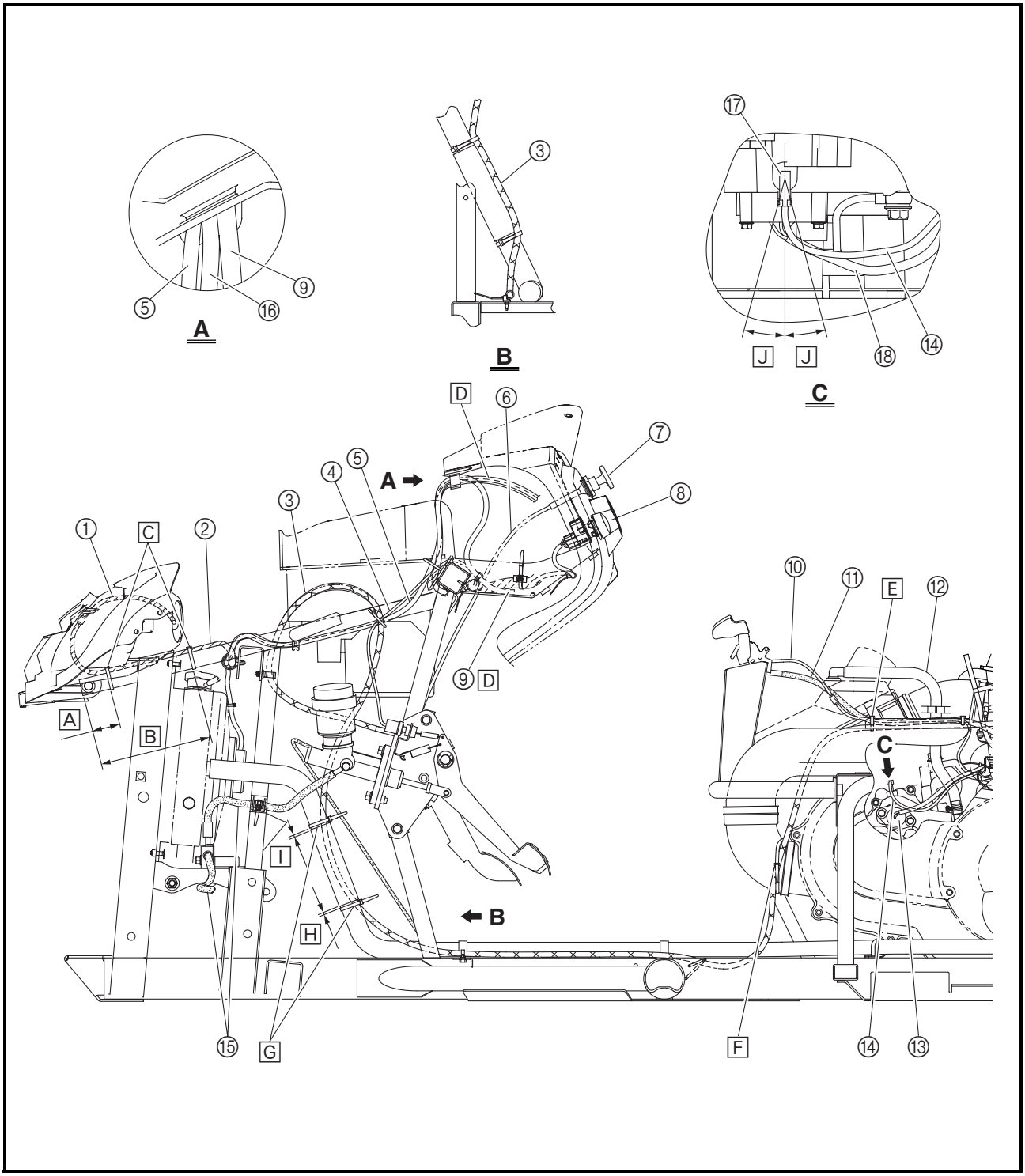


① Oil cooler
② Oil cooler inlet pipe 2
③ Oil cooler outlet pipe 2
④ Oil cooler inlet hose
⑤ Oil cooler outlet hose
⑥ Oil cooler inlet pipe 1
⑦ Oil cooler outlet pipe 1

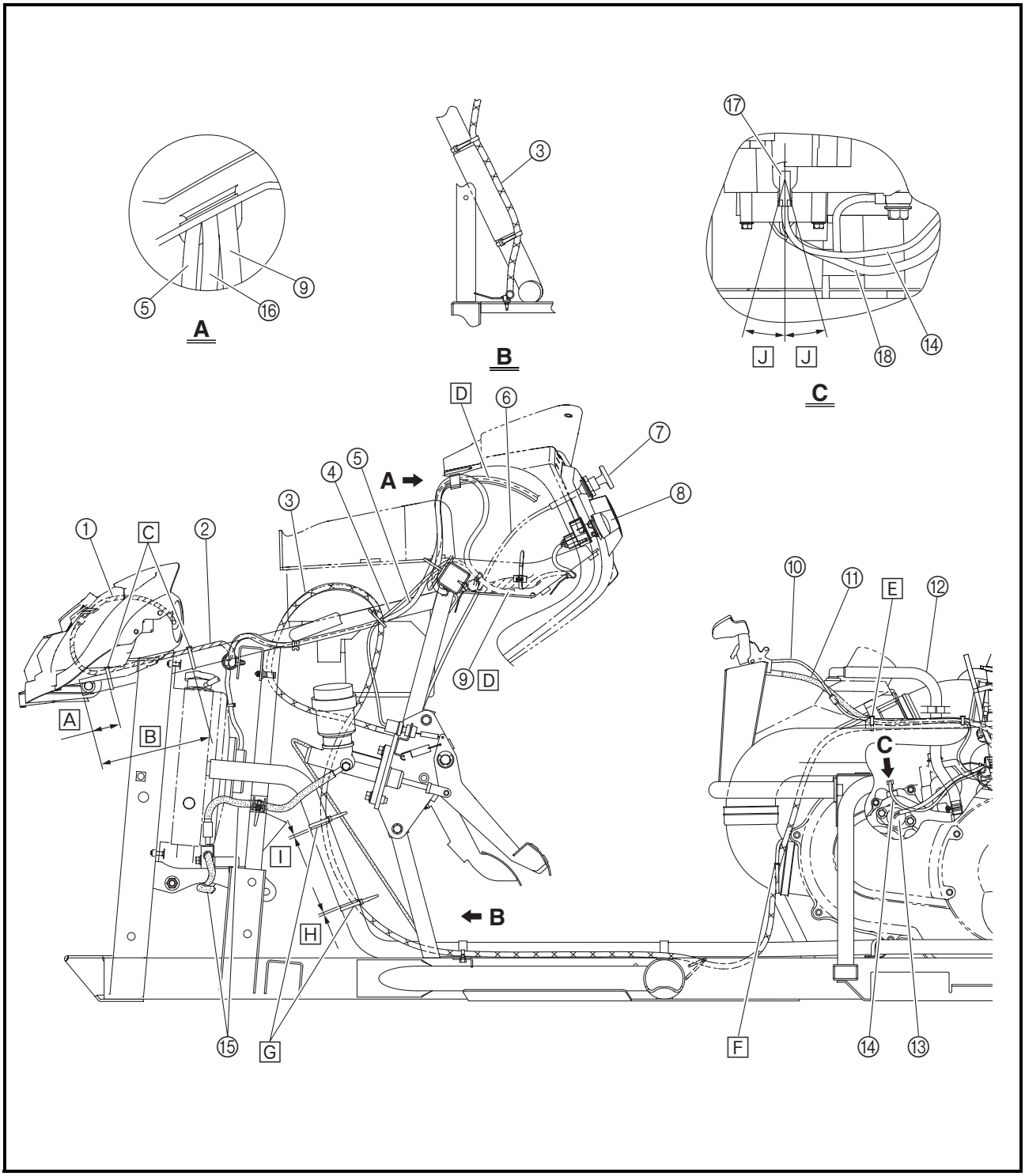


CABLE ROUTING

① Left headlight lead
② Wire harness
③ Throttle cable
④ Brake light switch lead
⑤ Radiator fan motor breather hose
⑥ Starter cable
⑦ Starter (choke) knob
⑧ Light switch
⑨ Coolant reservoir breather hose
⑩ Parking brake switch lead
⑪ Parking brake cable
⑫ Crankcase breather hose
⑬ Gear position switch
⑭ Reverse switch lead
⑮ Front brake hoses
⑯ Differential gear case breather hose
⑰ Reverse switch terminal
⑱ Gear position switch lead

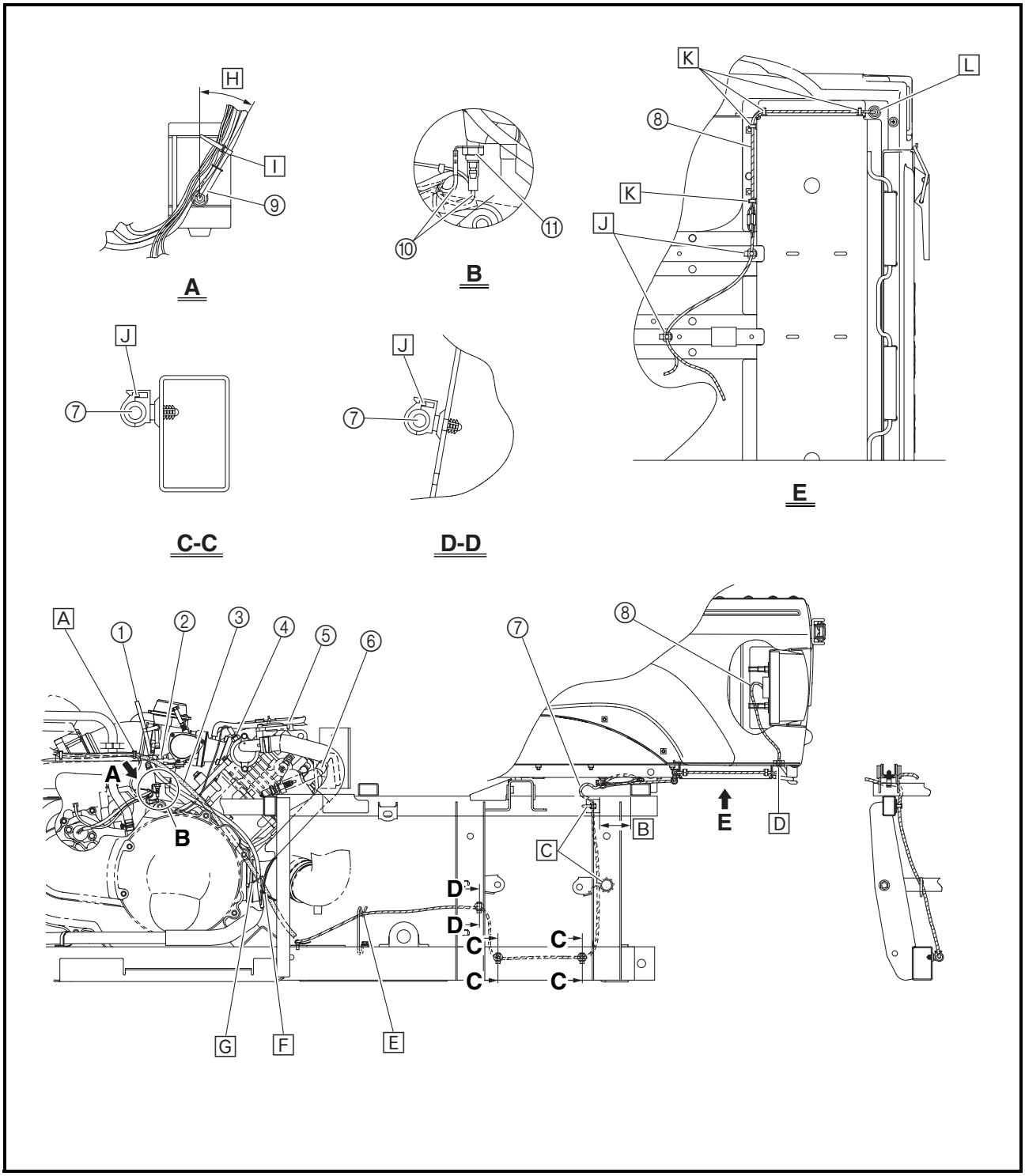


[A] 30 ~ 60 mm (1.18 ~ 2.36 in)
[B] 160 ~ 190 mm (6.30 ~ 7.48 in)
[C] Fasten the wire harness to the frame with the plastic bands.
[D] Pull the excess of the hoses through the guide in the upper instrument panel so that there is no slack in the hoses.
[E] Fasten the throttle cable, parking brake switch lead, and parking brake cable to the air duct assembly 1 with the plastic band.
[F] Fasten the throttle cable to the air duct assembly 1 with the plastic band.
[G] Fasten the radiator inlet hose and throttle cable with the plastic bands.
[H] 20 mm (0.79 in) or less
[I] 5 mm (0.20 in) or less
[J] 15°

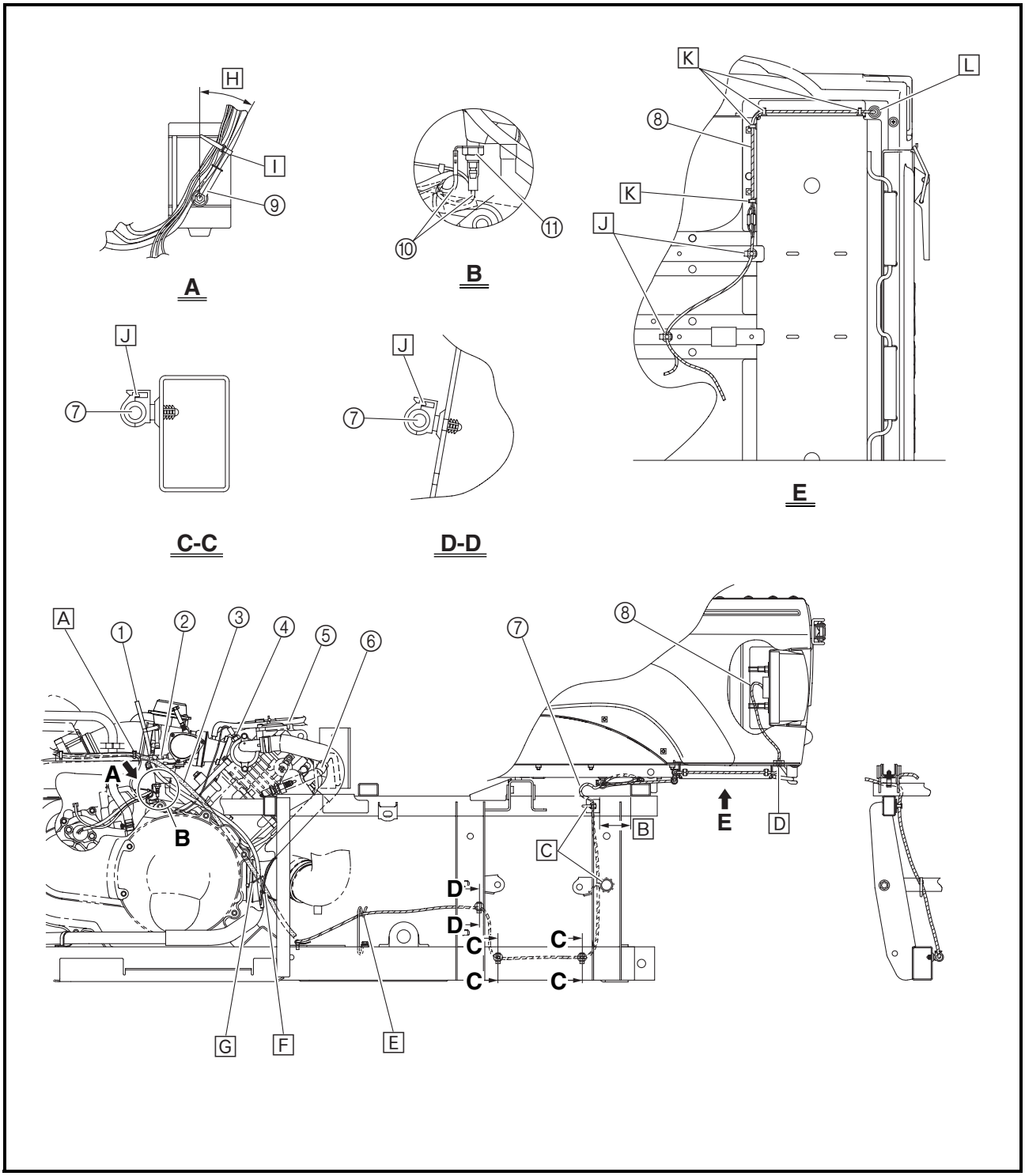


① Float chamber breather hose
② Throttle cable
③ Parking brake cable
④ Thermo switch 1
⑤ Vacuum hose
⑥ Spark plug cap
⑦ Wire harness
⑧ Tail/brake light lead
⑨ Starter motor lead
⑩ Carburetor heater leads
⑪ Carburetor heater

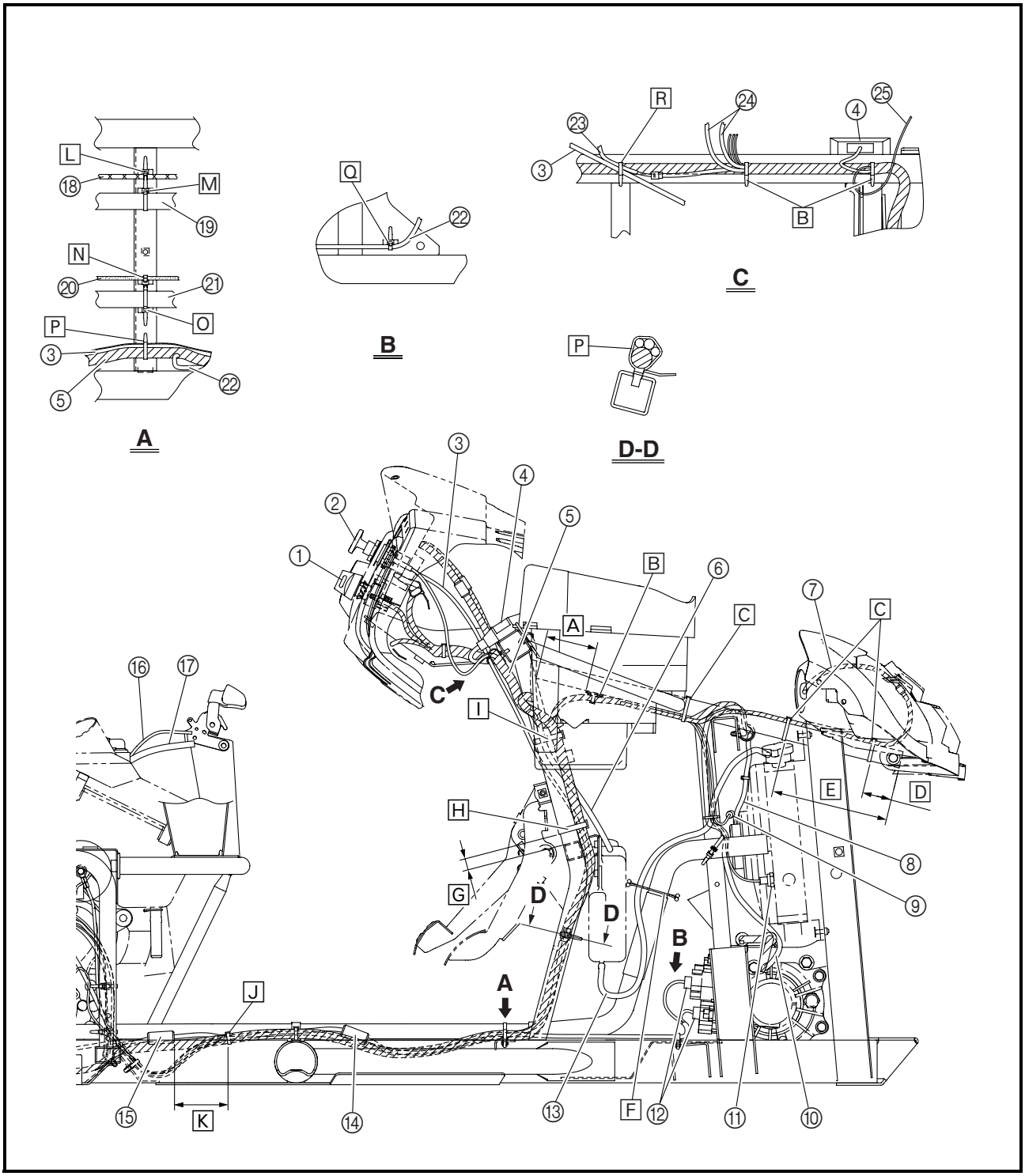
[A] Fasten the parking brake switch lead and parking brake cable to the air duct assembly 1 with the plastic band.
[B] 55 ~ 65 mm (2.17 ~ 2.56 in)
[C] Fasten the wire harness to the frame with the plastic bands.
[D] Pass the tail/brake light lead through the grommet.
[E] Pass the wire harness through the loop in the guide.



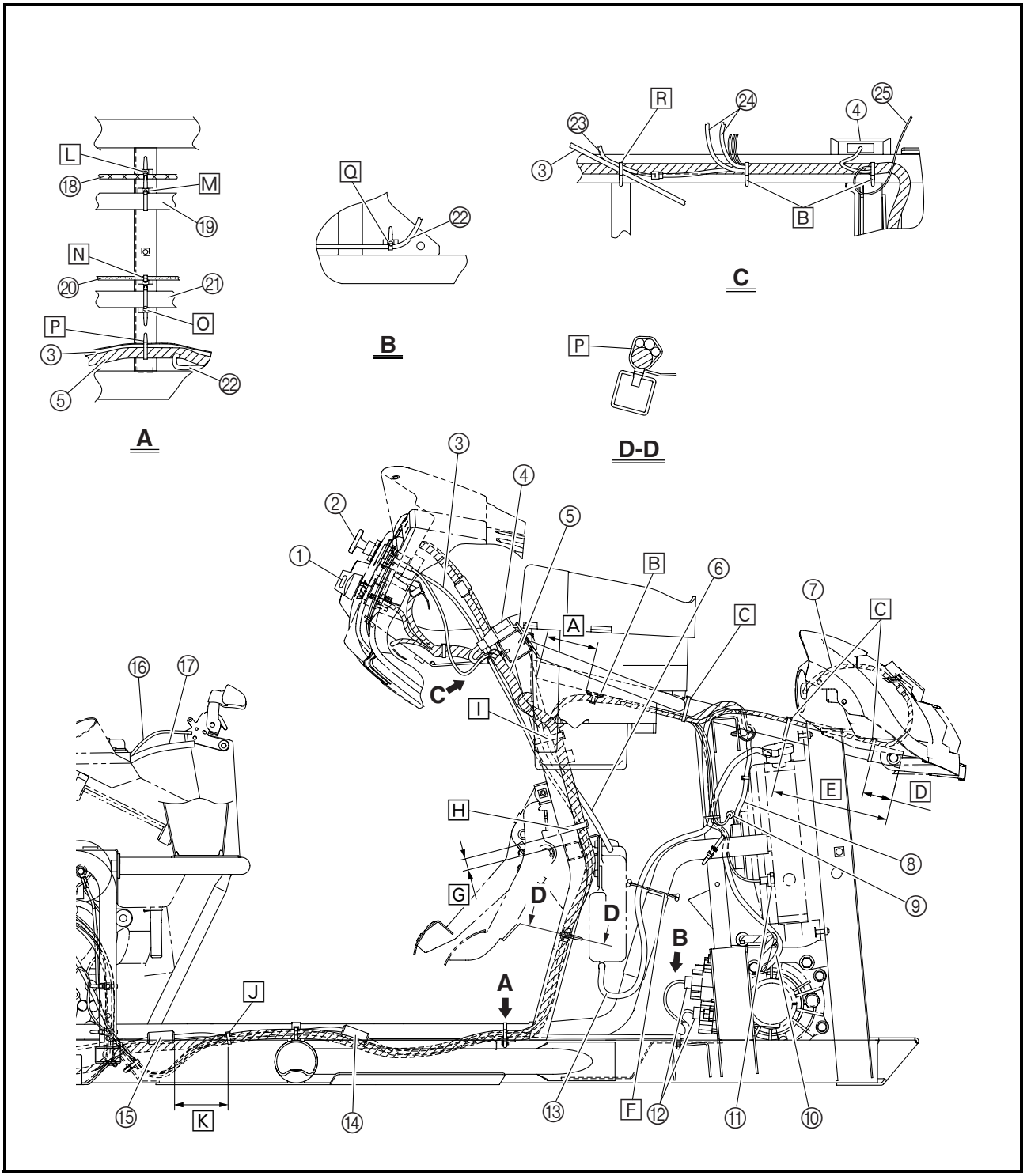
F Fasten the parking brake cable to the air duct assembly 2 with the plastic band.
G Fasten the parking brake cable and float chamber breather hose with the plastic clip.
H 20 ~ 40°
I Fasten the starter motor lead, reverse switch lead, gear position switch lead, thermo switch 1 lead, carburetor heater lead, and parking brake switch lead with the plastic band.
J Fasten the wire harness with the plastic holders.
K Fasten the tail/brake light lead with the plastic holders.
L Push the excess tail/brake light lead into the rear fender so that there is no slack in the lead.



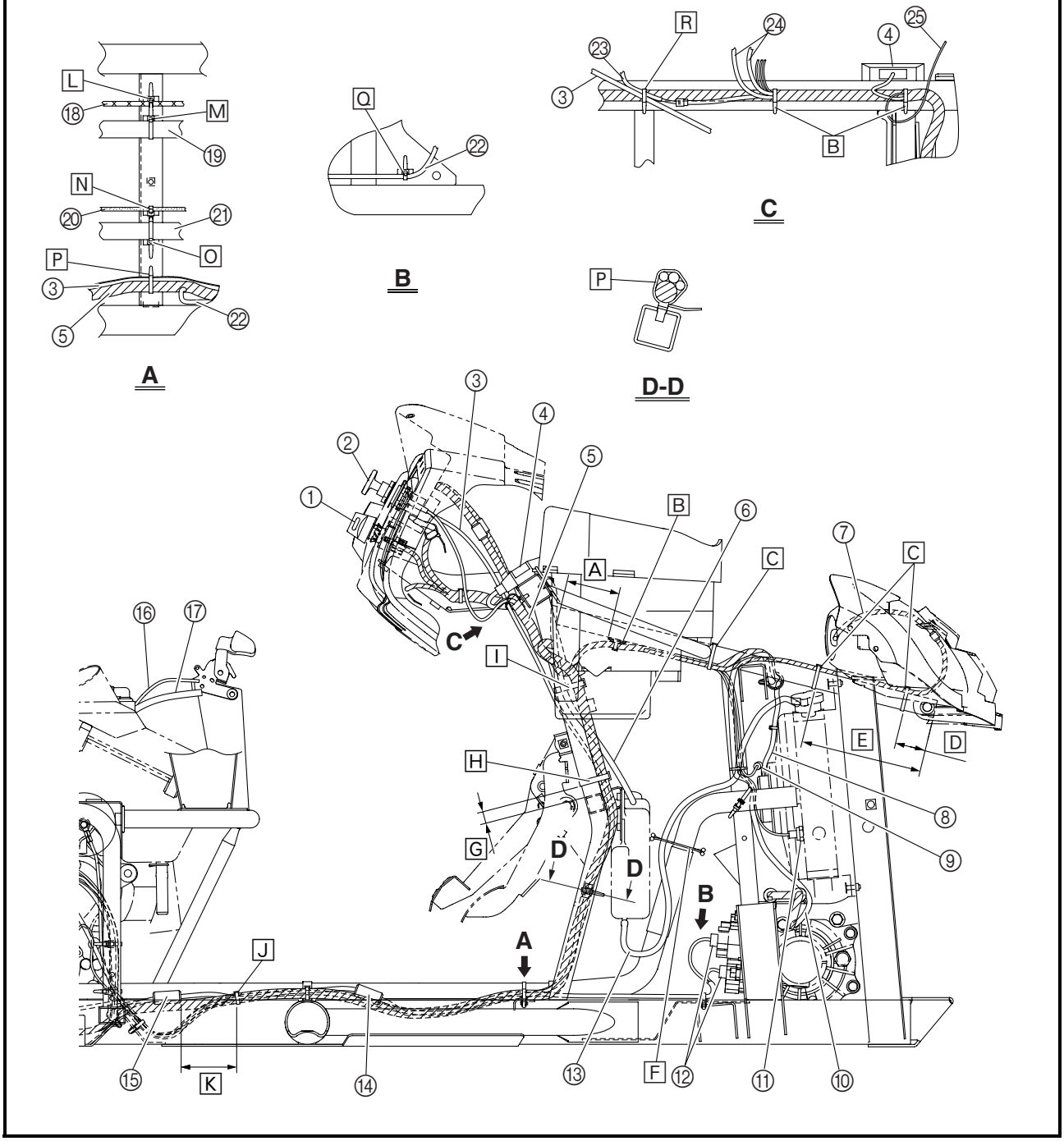
① Main switch
② Starter (choke) knob
③ Starter (choke) cable
④ Rectifier/regulator
⑤ Wire harness
⑥ Coolant reservoir breather hose
⑦ Right headlight lead
⑧ Radiator fan motor breather hose
⑨ Radiator fan motor coupler
⑩ Differential gear case breather hose
⑪ Thermo switch 3
⑫ Gear motor couplers
⑬ Coolant reservoir hose
⑭ Speed sensor coupler
⑮ A.C. magneto couplers
⑯ Parking brake switch lead
⑰ Parking brake cable
⑱ Throttle cable
⑲ Radiator inlet pipe
⑳ Rear brake pipe
㉑ Radiator outlet pipe
㉒ Gear motor lead
㉓ Brake light switch lead
㉔ Indicator light assembly leads
㉕ Auxiliary DC jack lead



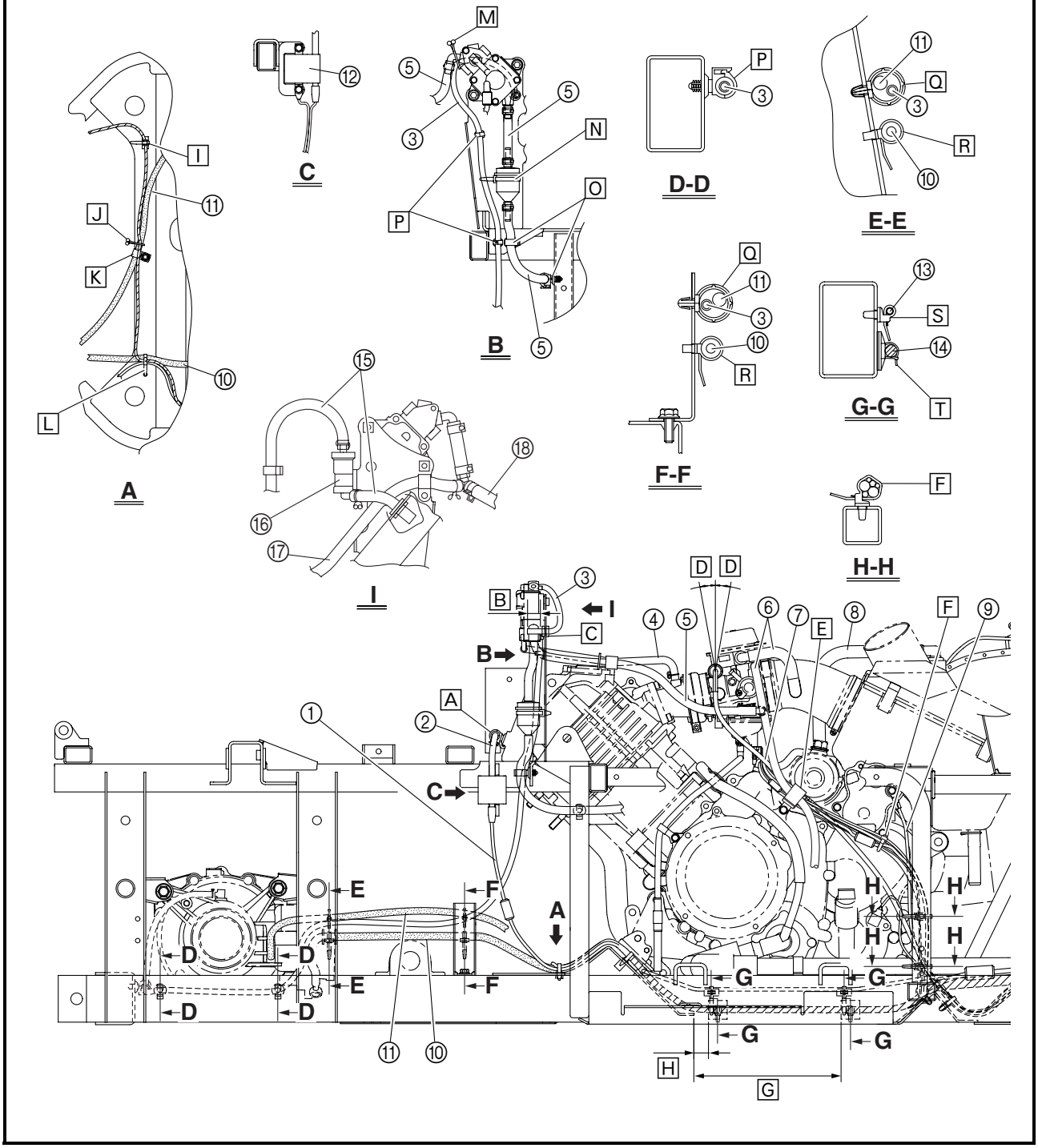
[A] 70 ~ 80 mm (2.76 ~ 3.15 in)
[B] Fasten the wire harness with the plastic bands.
[C] Fasten the wire harness to the frame with the plastic locking ties.
[D] 30 ~ 60 mm (1.18 ~ 2.36 in)
[E] 160 ~ 190 mm (6.30 ~ 7.48 in)
[F] Fasten the radiator outlet hose and coolant reservoir hose with the plastic clip.
[G] 12 ~ 22 mm (0.47 ~ 0.87 in)
[H] Fasten the wire harness, starter motor lead, ground lead, and starter (choke) cable to the frame with the plastic band.
[I] Fasten the wire harness, starter motor lead, and ground lead to the frame with the plastic band.
[J] Fasten the wire harness, speed sensor lead, starter (choke) cable, starter motor lead, and ground lead with the plastic band.



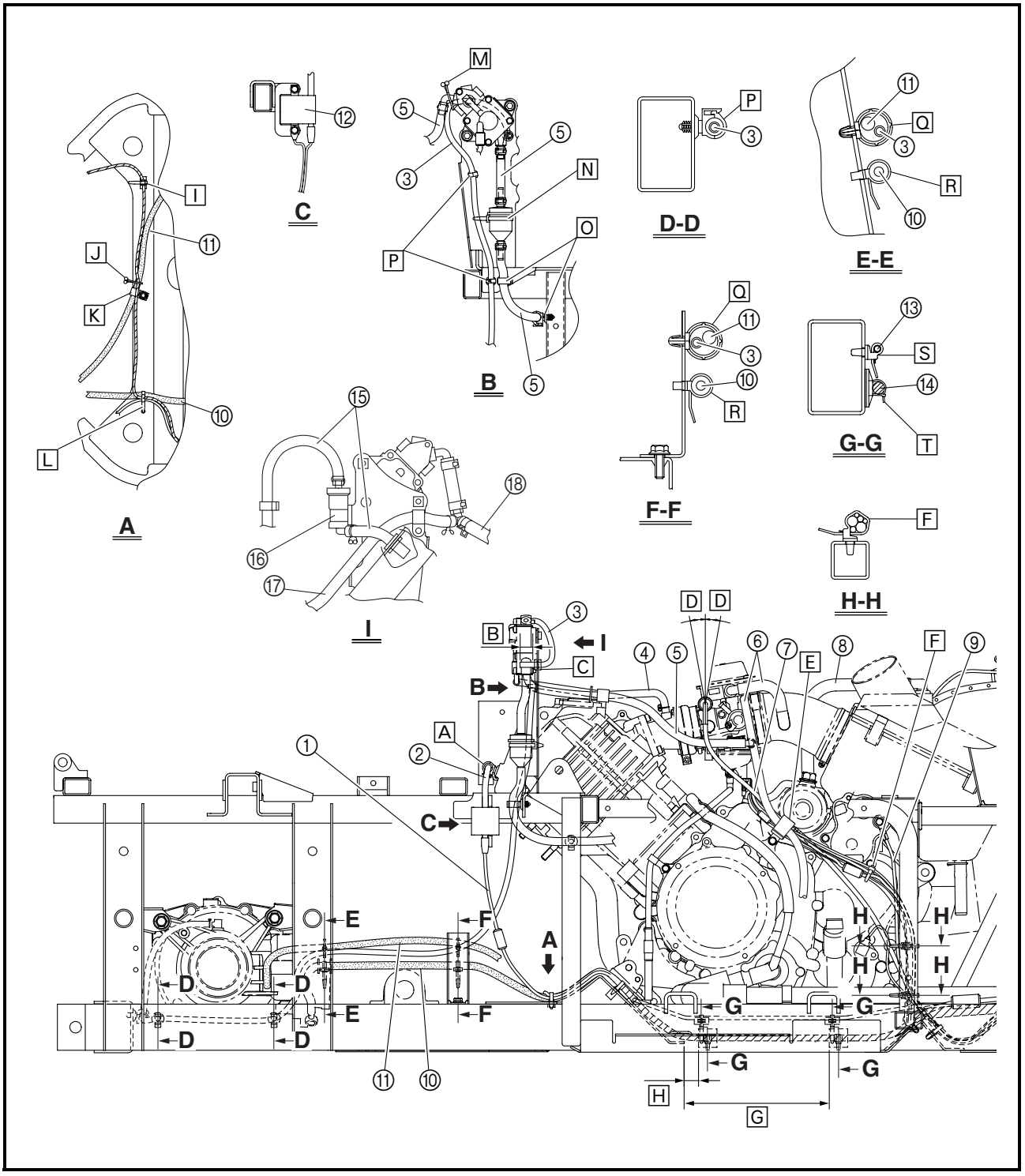
[K] 70 ~ 90 mm (2.76 ~ 3.54 in)
[L] Fasten the throttle cable with the plastic band.
[M] Fasten the radiator inlet pipe with the plastic band.
[N] Fasten the rear brake pipe with the plastic band.
[O] Fasten the radiator outlet pipe with the plastic band.
[P] Fasten the wire harness, starter (choke) cable, starter motor lead, and ground lead with the plastic bands.
[Q] Fasten the gear motor lead with the plastic band.
[R] Fasten the wire harness, brake light switch lead, and starter (choke) cable with the plastic band.



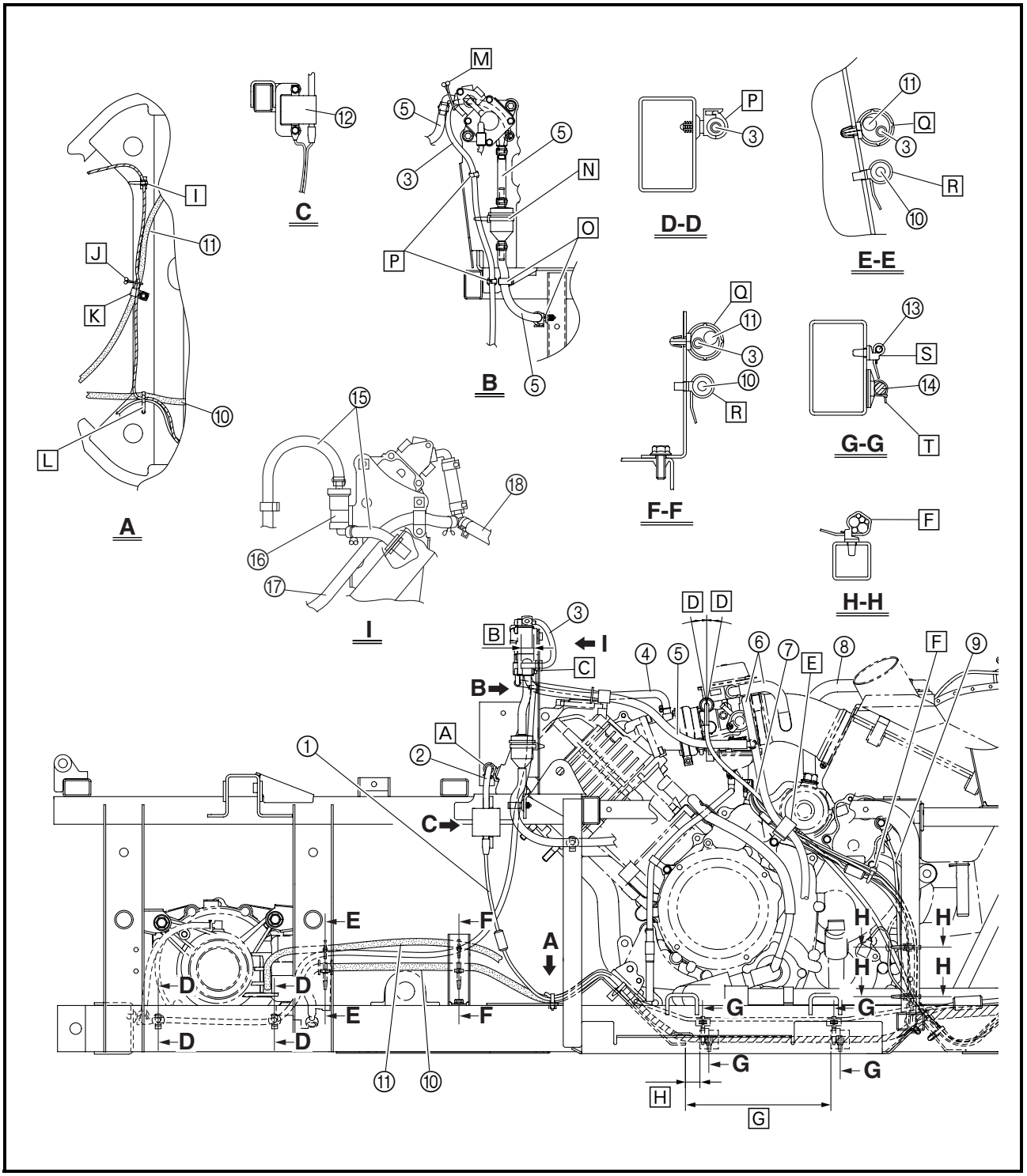
① Ignition coil lead
② Spark plug lead
③ Final gear case breather hose
④ Vacuum hose
⑤ Fuel hoses
⑥ Air vent hoses
⑦ Starter (choke) cable
⑧ Crankcase breather hose
⑨ Ground lead
⑩ Rear brake hose
⑪ Parking brake cable
⑫ Ignition coil
⑬ Rear brake pipe
⑭ Wire harness
⑮ Fuel tank breather hose
⑯ Rollover valve
⑰ Fuel return hose
⑱ Fuel suction hose



[A] Fasten the spark plug lead with the plastic holder.
[B] 20 ~ 30 mm (0.79 ~ 1.18 in)
[C] Pass the final gear case breather hose through the grommet.
[D] 10°
[E] Fasten the starter (choke) cable, starter motor lead, reverse switch lead, gear position switch lead, thermo switch 1 lead, carburetor heater lead, parking brake switch lead, and air vent hose with the metal holder.
[F] Fasten the A.C. magneto leads, reverse switch lead, gear position switch lead, thermo switch 1 lead, carburetor heater lead, and parking brake switch lead with the plastic bands.
[G] 195 ~ 205 mm (7.68 ~ 8.07 in)
[H] 15 ~ 25 mm (0.59 ~ 0.98 in)
[I] Fasten the wire harness with the plastic band.
[J] Fasten the parking brake cable and wire harness with the plastic clip.

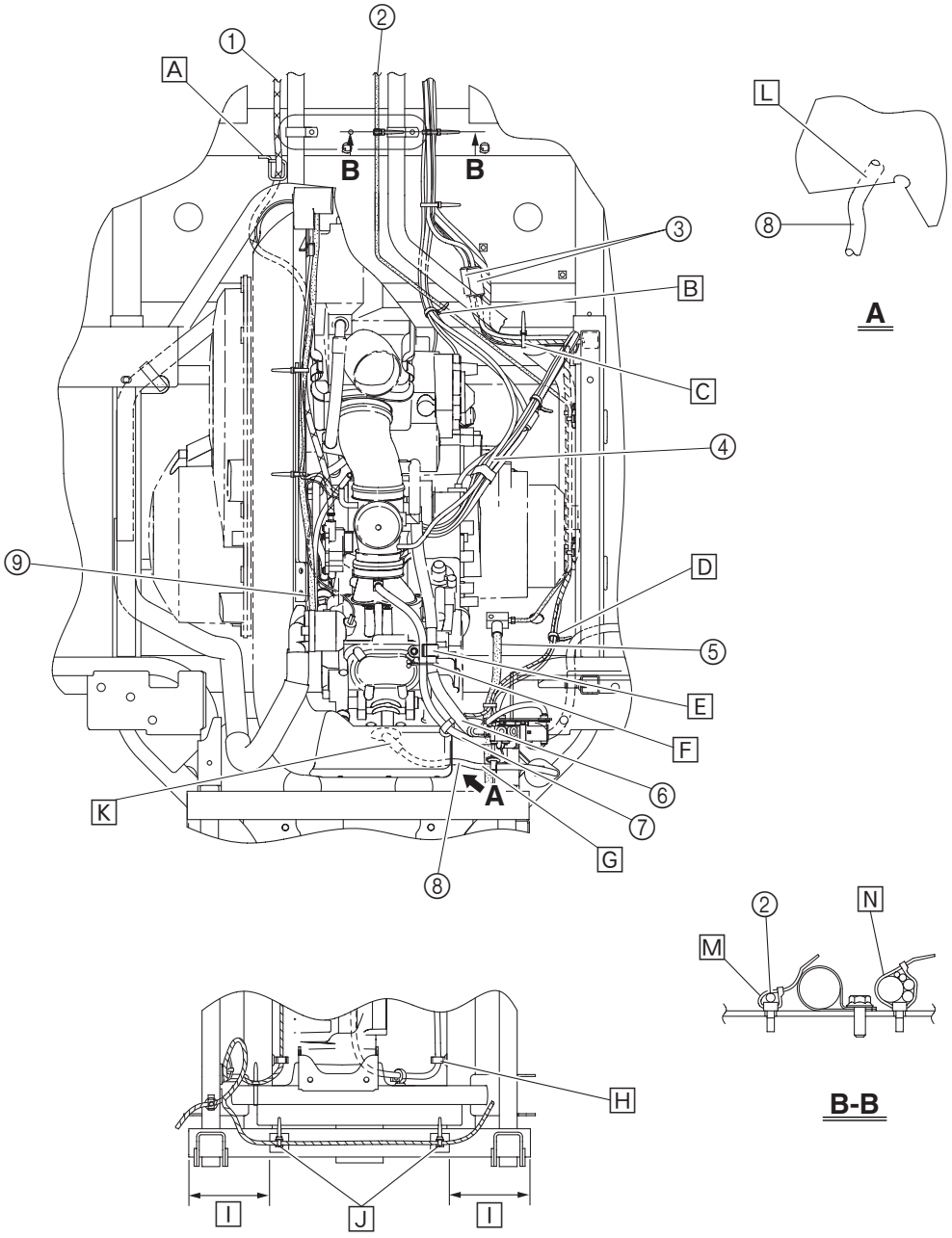


[K] Fasten the parking brake cable with the metal holder.
[L] Fasten the wire harness, ignition coil lead, and rear brake hose with the plastic band.
[M] Fasten the final gear case breather hose and fuel hose with the plastic clip.
[N] Fasten the fuel filter with the plastic band.
[O] Fasten the fuel hose with the plastic holders.
[P] Fasten the final gear case breather hose with the plastic holders.
[Q] Fasten the parking brake cable and final gear case breather hose with the plastic holders.
[R] Fasten the rear brake hose with the plastic bands.
[S] Fasten the rear brake pipe with the plastic bands.
[T] Fasten the wire harness with the plastic bands.

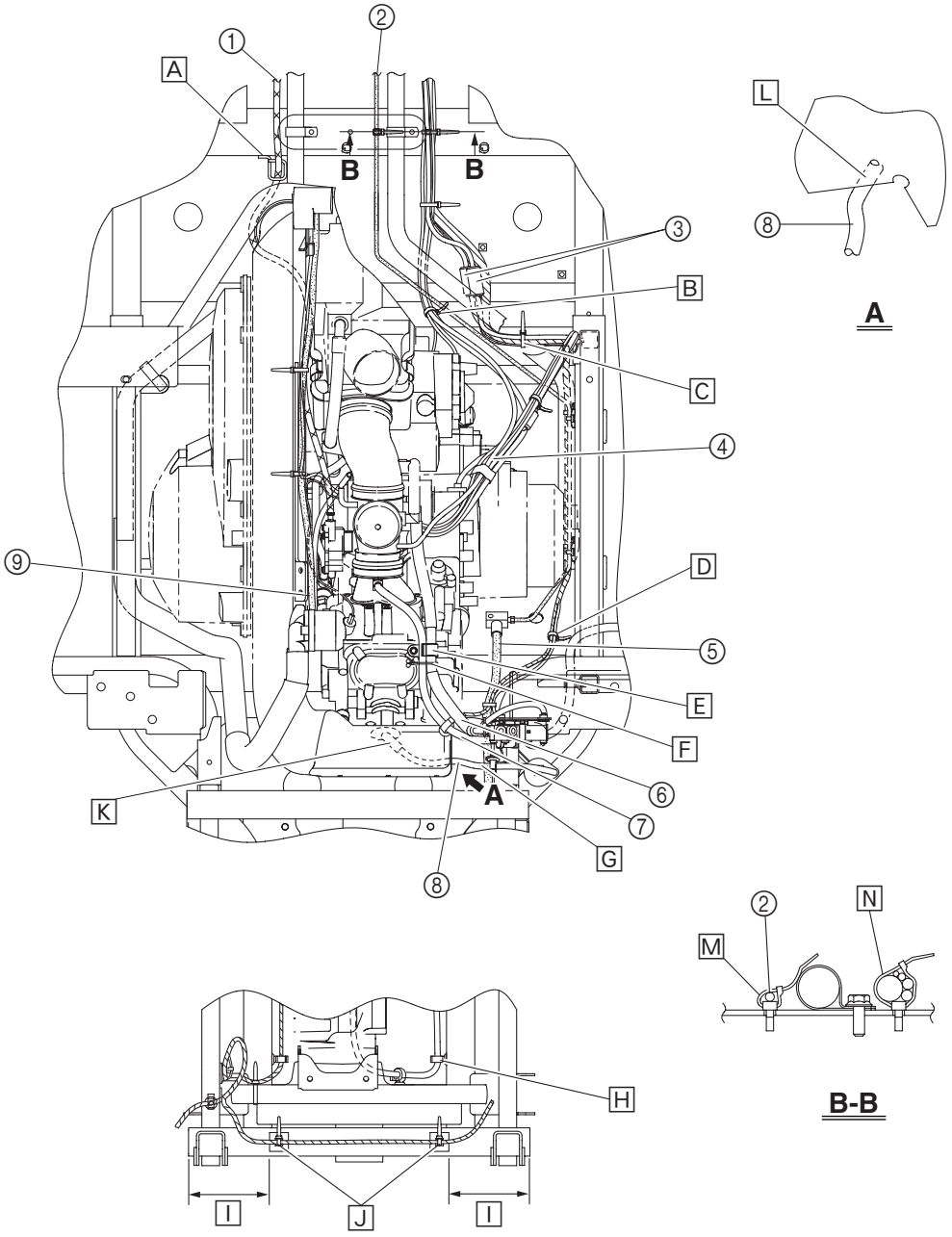


① Throttle cable
② Rear brake pipe
③ A.C. magneto couplers
④ Starter (choke) cable
⑤ Rear brake hose
⑥ Fuel hose
⑦ Vacuum hose
⑧ Spark plug lead
⑨ Parking brake cable

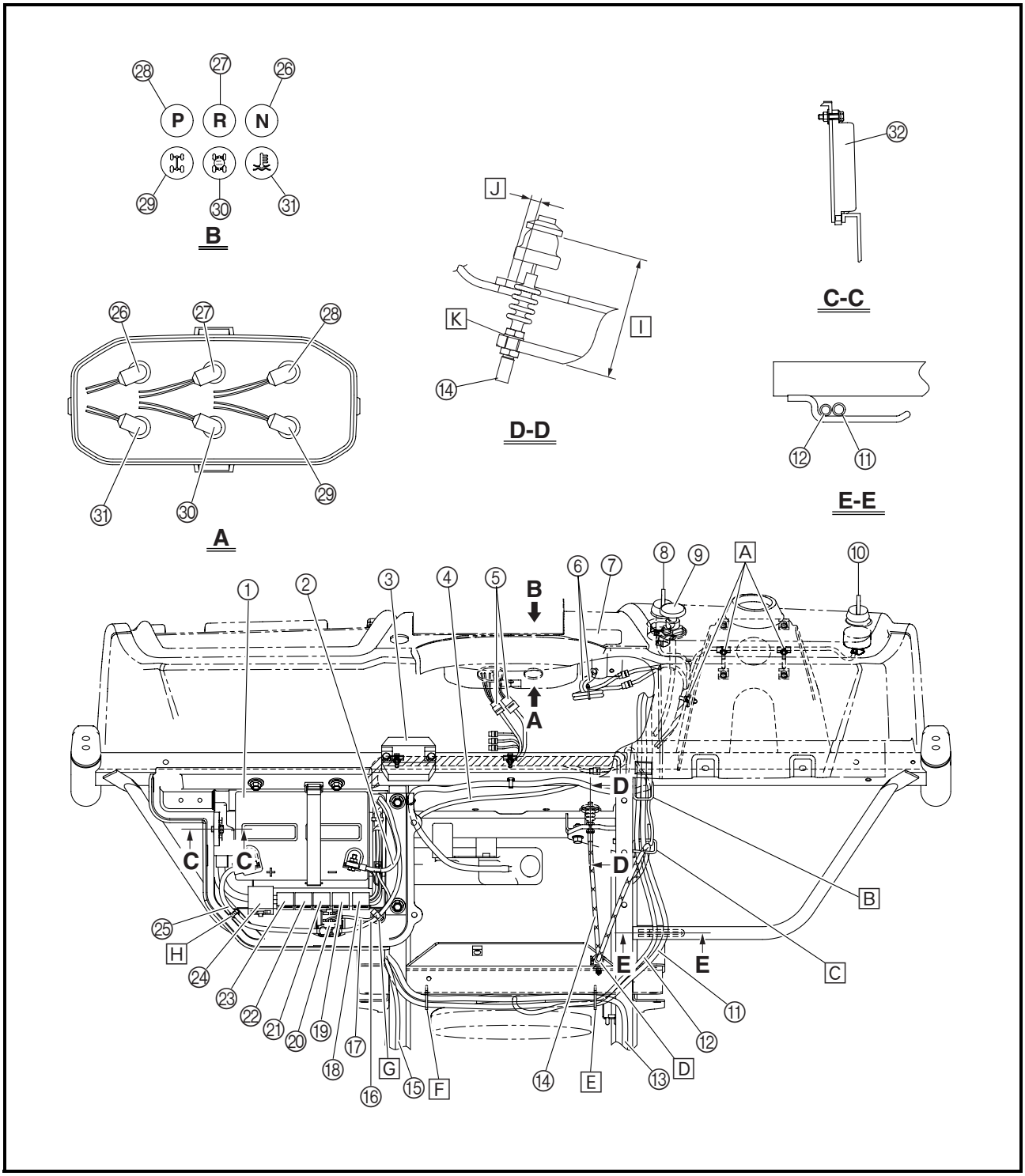
Ⓐ Pass the throttle cable through the cable guide.
Ⓑ Fasten the speed sensor lead, starter (choke) cable, starter motor lead, and ground lead with the plastic band.
Ⓒ Fasten the wire harness and A.C. magneto lead with the plastic band.
Ⓓ Fasten the wire harness with the plastic band.
Ⓔ Fasten the fuel hose with the metal holder.



F Fasten the fuel hose and vacuum hose with the plastic clip.
G Make sure that the spark plug lead does not contact the frame.
H Fasten the final gear case breather hose with the plastic holder.
I 105 ~ 115 mm (4.13 ~ 4.53 in)
J Fasten the wire harness with the plastic bands.
K The end of the spark plug cap boot must face towards the passenger side of the vehicle.
L Pass the spark plug lead through the cutout in the protective cover as shown.
M Fasten the rear brake pipe with the plastic band.
N Fasten the wire harness, speed sensor lead, starter (choke) cable, starter motor lead, and ground lead with the plastic band.

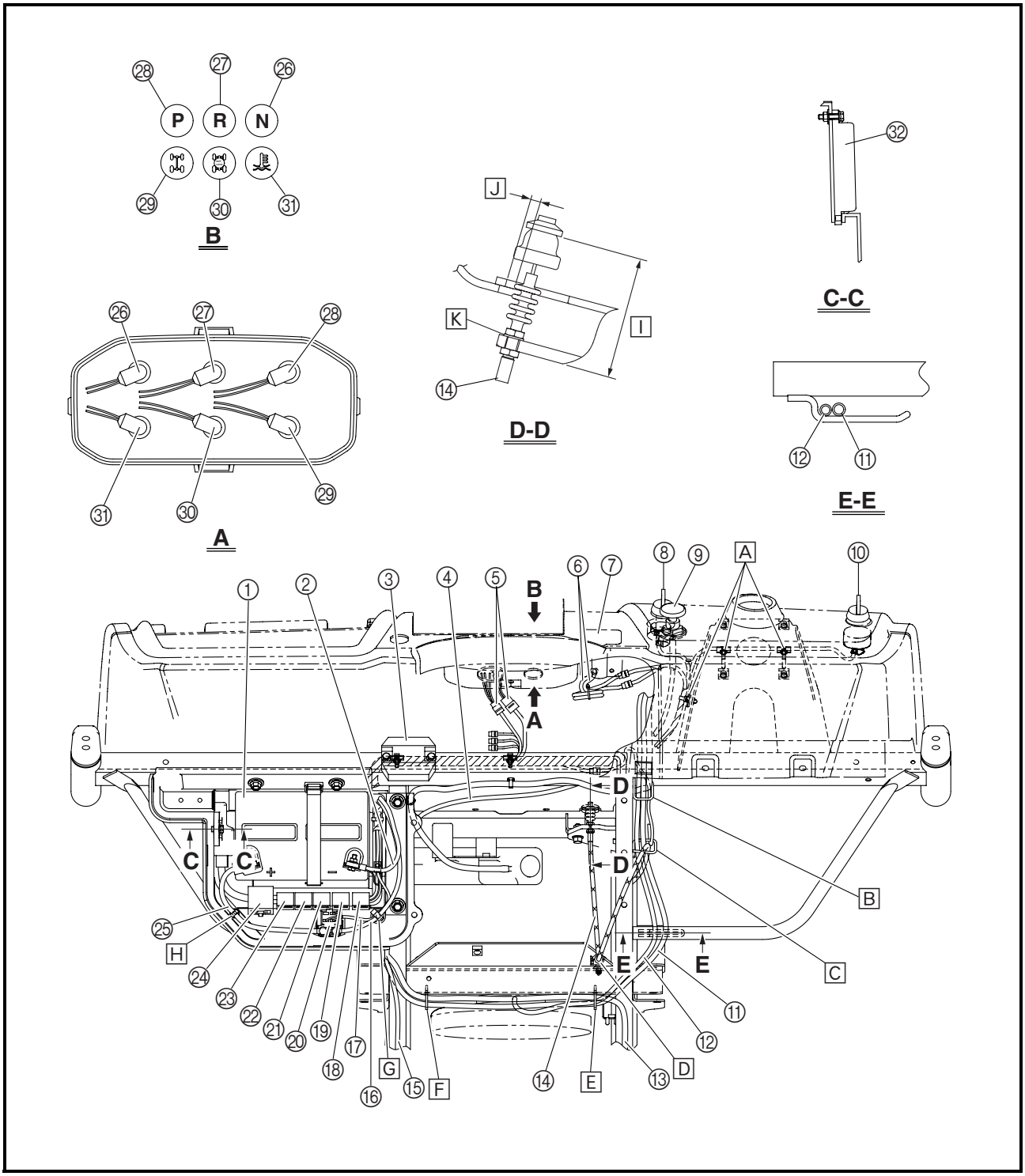


① Battery
② Negative battery lead
③ Rectifier/regulator
④ Starter (choke) cable
⑤ Indicator light assembly couplers
⑥ On-Command four-wheel drive switch and differential gear lock switch leads
⑦ On-Command four-wheel drive switch and differential gear lock switch
⑧ Main switch
⑨ Starter (choke) knob
⑩ Light switch
⑪ Differential gear case breather hose
⑫ Radiator fan motor breather hose
⑬ Left headlight lead
⑭ Throttle cable
⑮ Right headlight lead
⑯ Starter motor lead
⑰ Starter relay lead
⑱ Four-wheel drive relay 1
⑲ Four-wheel drive relay 2
⑳ Starter relay

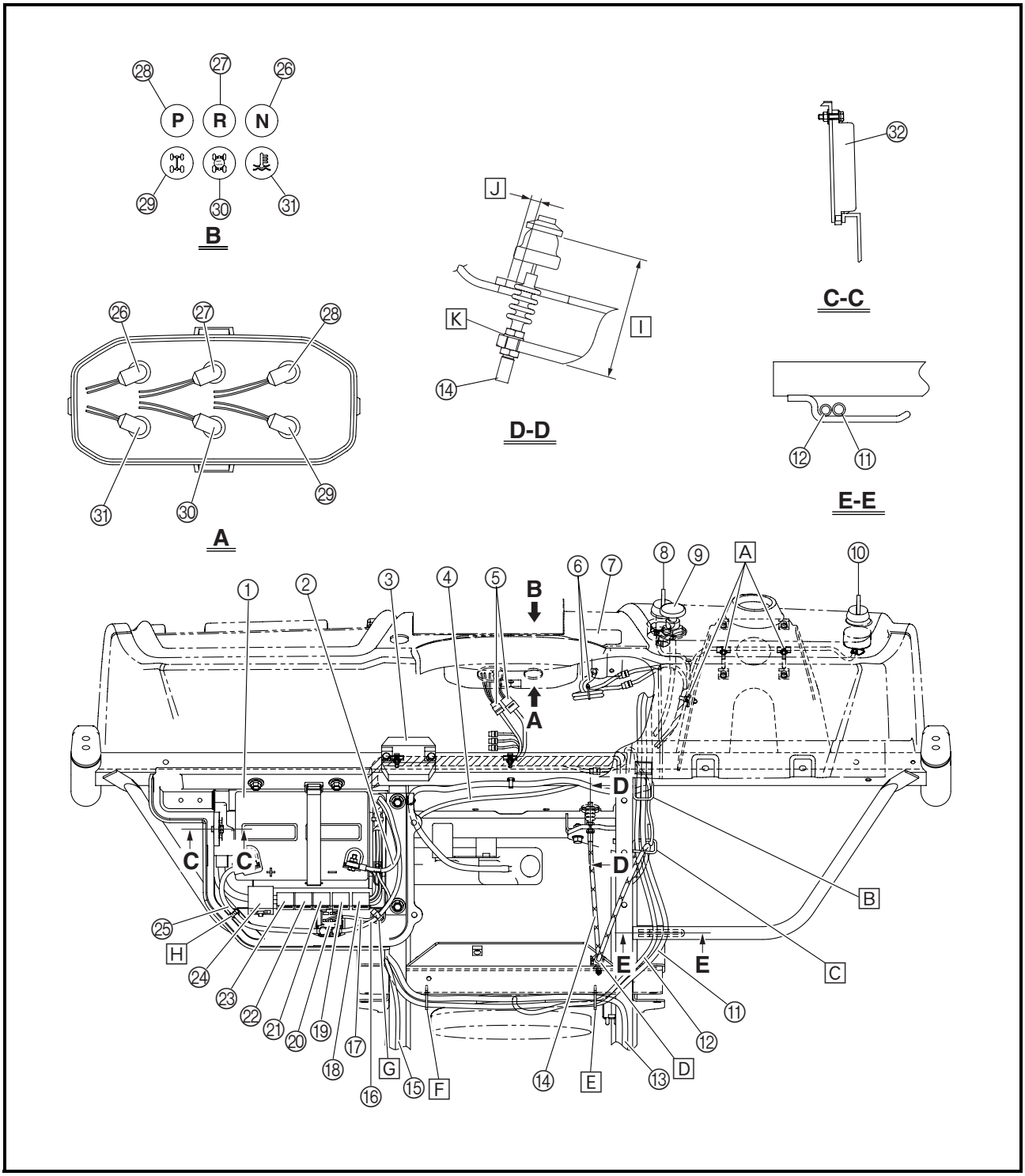


㉑ Four-wheel drive relay 3
㉒ Differential gear lock indicator light relay
㉓ Four-wheel drive indicator light relay
㉔ Fuse box
㉕ Positive battery lead
㉖ Neutral indicator light
㉗ Reverse indicator light
㉘ Parking brake indicator light
㉙ Four-wheel drive indicator light
㉚ Differential gear lock indicator light
㉛ Coolant temperature indicator light
㉜ C.D.I. unit

[A] Fasten the wire harness with the plastic bands.
[B] Pass the radiator fan motor breather hose, differential gear case breather hose, coolant reservoir breather hose, and brake light switch lead through the guide.
[C] Pass the radiator fan motor breather hose, differential gear case breather hose, throttle cable, and brake light switch lead through the guide.

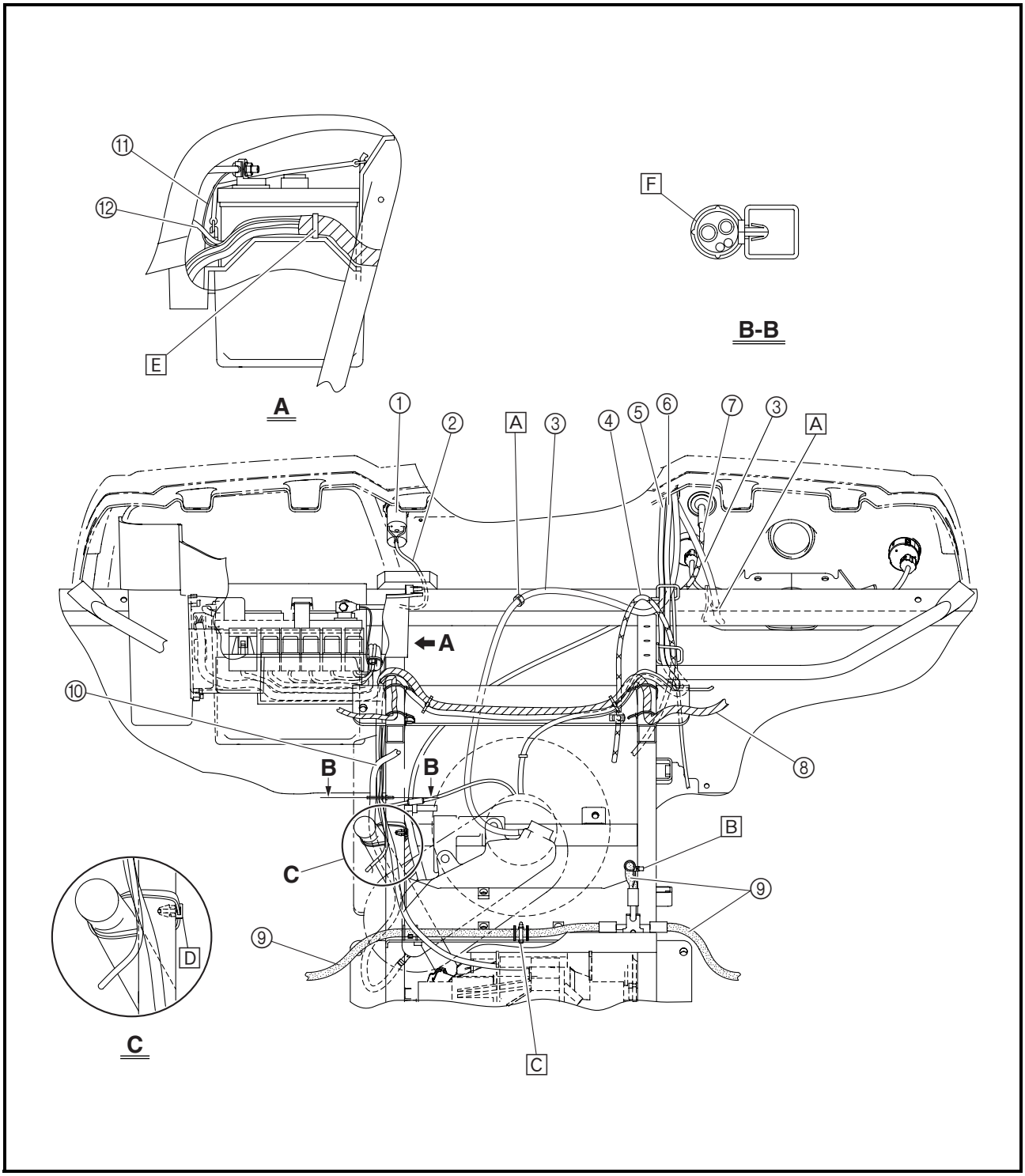


[D] Fasten the throttle cable with the plastic holder.
[E] Fasten the left headlight lead, differential gear case breather hose, and radiator fan motor breather hose with the plastic holder.
[F] Fasten the left headlight lead and differential gear case breather hose with the plastic holder.
[G] Fasten the starter motor lead and starter relay lead with the plastic holder.
[H] Fasten the positive battery lead with the plastic holder.
[I] 60 mm (2.36 in)
[J] 4 mm (0.16 in) of clearance or more is required around the boot.
[K] Make sure that the washer is installed on the side of the pedal assembly bracket towards the boot.

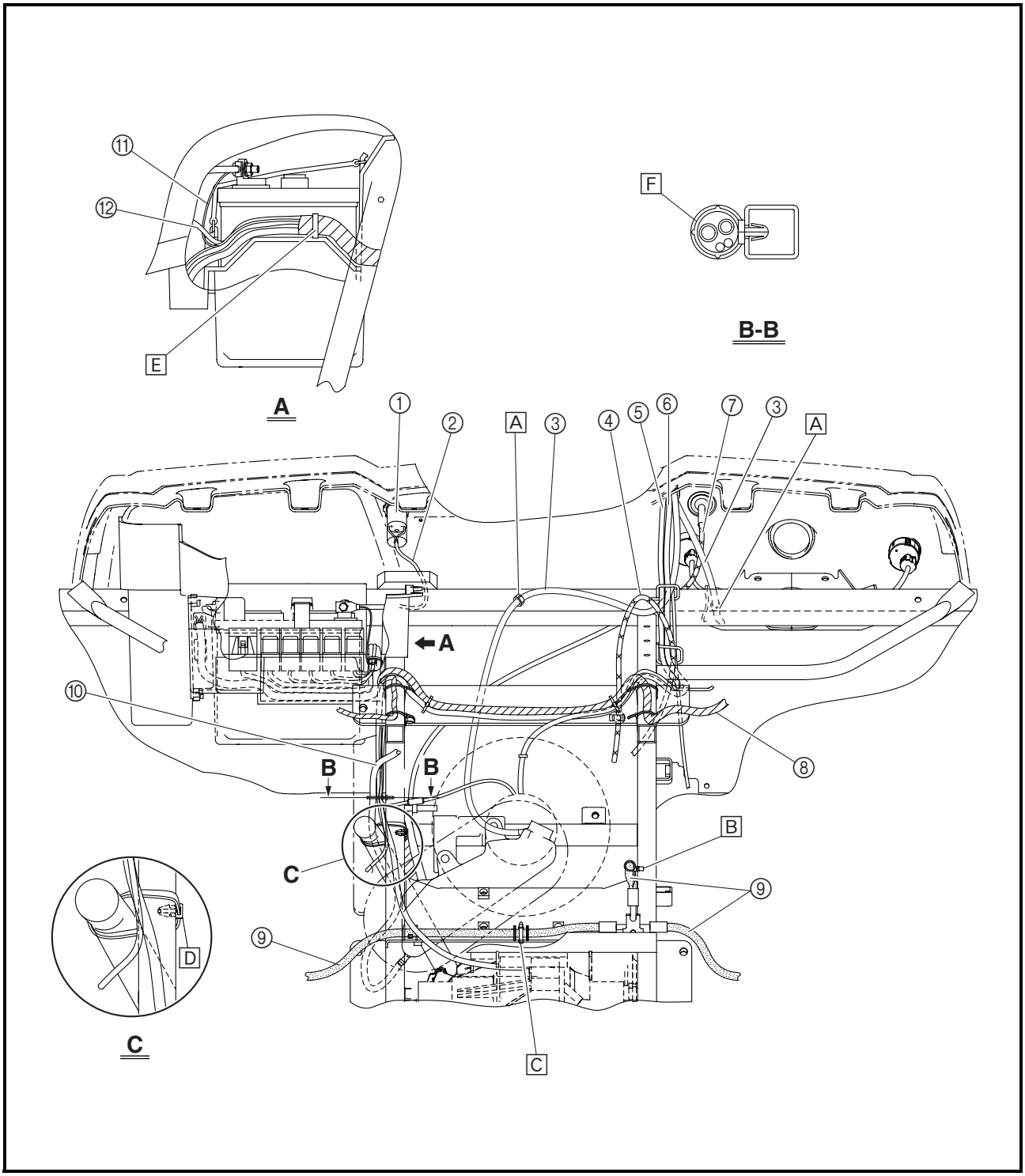


① Auxiliary DC jack
② Auxiliary DC jack lead
③ Coolant reservoir breather hose
④ Throttle cable
⑤ Radiator fan motor breather hose
⑥ Differential gear case breather hose
⑦ Starter (choke) cable
⑧ Wire harness
⑨ Front brake hoses
⑩ Coolant reservoir hose
⑪ Ground lead
⑫ Starter relay lead

[A] Fasten the coolant reservoir breather hose with the plastic band.
[B] Fasten the front brake hose with the plastic band.
[C] Fasten the front brake hose with the plastic band.
[D] Fasten the radiator outlet hose with the plastic band.



E Fasten the wire harness and ground lead with the plastic band.
F Fasten the differential gear case breather hose, coolant reservoir hose, radiator fan motor lead, and thermo switch 3 lead with the plastic holder.



EB300000

PERIODIC CHECKS AND ADJUSTMENTS

INTRODUCTION

This chapter includes all information necessary to perform recommended checks and adjustments. These preventive maintenance procedures, if followed, will ensure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. This information applies to vehicles already in service as well as to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

EB301000

PERIODIC MAINTENANCE/LUBRICATION

NOTE:

- For vehicles not equipped with an odometer or hour meter, follow the month maintenance intervals.
- For vehicles equipped with an odometer or an hour meter, follow the km (mi) or hours maintenance intervals. However, keep in mind that if the vehicle isn't used for a long period of time, the month maintenance intervals should be followed.

ITEM	ROUTINE	Whichever comes first ⇨		INITIAL			EVERY	
			month	1	3	6	6	12
			km (mi)	320 (200)	1,200 (750)	2,400 (1,500)	2,400 (1,500)	4,800 (3,000)
			hours	20	75	150	150	300
Valves*	• Check valve clearance. • Adjust if necessary.			○		○	○	○
Cooling system	• Check coolant leakage. • Repair if necessary. • Replace coolant every 24 months.			○	○	○	○	○
Spark plug	• Check condition. • Adjust gap and clean. • Replace if necessary.			○	○	○	○	○
Air filter element	• Clean. • Replace if necessary.			**Every 20 ~ 40 hours (More often in wet or dusty areas.)**				
Carburetor*	• Check idle speed/starter operation. • Adjust if necessary.				○	○	○	○
Crankcase breather system*	• Check breather hose for cracks or damage. • Replace if necessary.					○	○	○
Exhaust system*	• Check for leakage. • Tighten if necessary. • Replace gasket(s) if necessary.					○	○	○
Sparks arrester	• Clean.					○	○	○
Fuel line*	• Check fuel hose for cracks or damage. • Replace if necessary.					○	○	○
Engine oil	• Replace (warm engine before draining).			○		○	○	○
Engine oil filter cartridge	• Replace.			○		○		○
Final gear oil	• Check oil level/oil leakage. • Replace.			○				○
Differential gear oil								
Front brake*	• Check operation/brake pad wear/fluid leakage/see NOTE page 3-2. • Correct if necessary. Replace pads if worn to the limit.			○	○	○	○	○
Rear brake*	• Check operation/brake pad wear/fluid leakage/see NOTE page 3-2. • Correct if necessary. Replace pads if worn to the limit.			○	○	○	○	○

ITEM	ROUTINE	Whichever comes first ⇨		INITIAL			EVERY	
			month	1	3	6	6	12
			km (mi)	320 (200)	1,200 (750)	2,400 (1,500)	2,400 (1,500)	4,800 (3,000)
			hours	20	75	150	150	300
Accelerator pedal*	• Check operation and free play.			○	○	○	○	○
V-belt*	• Check operation. • Check for wear, cracks, or damage.			○			○	○
Wheels*	• Check balance/damage/runout. • Repair if necessary.			○		○	○	○
Wheel bearings*	• Check bearing assemblies for looseness/damage. • Replace if damaged.			○		○	○	○
Front and rear suspension*	• Check operation and for leakage. • Correct if necessary.					○		○
Steering system*	• Check operation and for looseness/Replace if damaged. • Check toe-in/Adjust if necessary.			○	○	○	○	○
Rear upper and lower knuckle pivots*	• Lubricate with lithium-soap-based grease.					○	○	○
Drive shaft universal joint*	• Lubricate with lithium-soap-based grease.					○	○	○
Engine mount*	• Check for cracks or damage. • Check bolt tightness.					○	○	○
Front and rear axle boots*	• Check operation. • Replace if damaged.			○				○
Stabilizer bushings*	• Check for cracks or damage.					○	○	○
Fittings and fasteners*	• Check all chassis fittings and fasteners. • Correct if necessary.			○	○	○	○	○

* Since these items require special tools, data and technical skills have a Yamaha dealer perform the service.

NOTE:

- Recommended brake fluid: DOT 4
- Brake fluid replacement:
  - When disassembling the master cylinder or caliper, replace the brake fluid. Normally check the brake fluid level and add fluid as required.
  - On the inner parts of the master cylinder and caliper, replace the oil seals every two years.
  - Replace the brake hoses every four years, or if cracked or damaged.

ENGINE

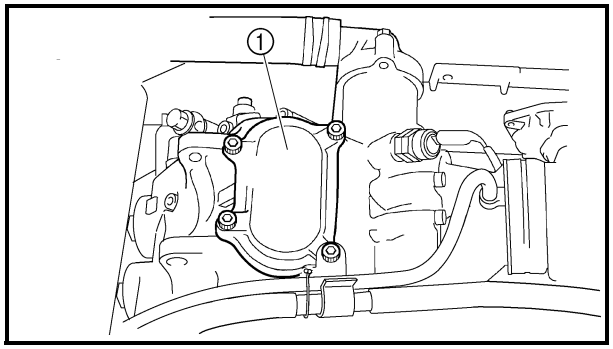
ADJUSTING THE VALVE CLEARANCE

NOTE:

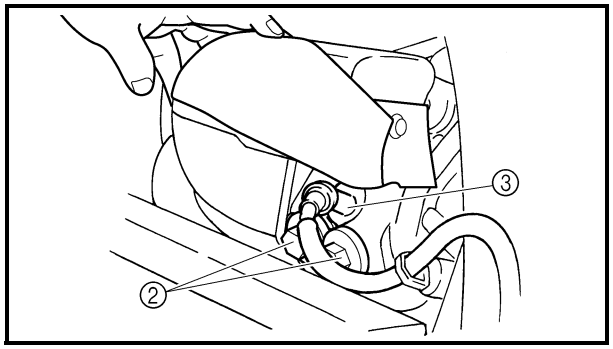
- The valve clearance must be adjusted when the engine is cool to the touch.
- Adjust the valve clearance when the piston is at the Top Dead Center (TDC) on the compression stroke.

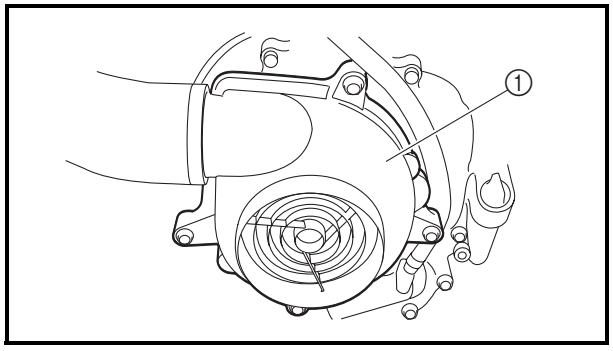
1. Remove:
   - driver seat
   - passenger seat
   - console

   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
2. Lift the cargo bed up.

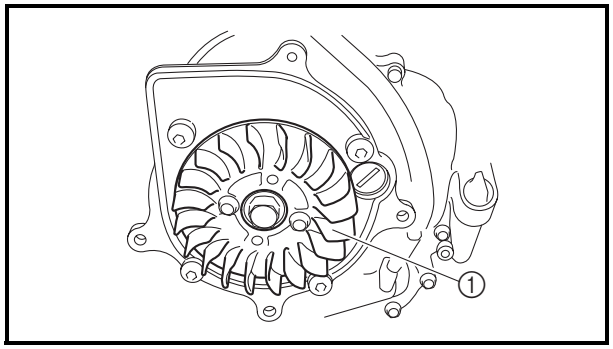


3. Remove:
   - tappet cover (intake) ①
   - tappet covers (exhaust) ②
4. Disconnect:
   - spark plug cap ③
5. Remove:
   - spark plug

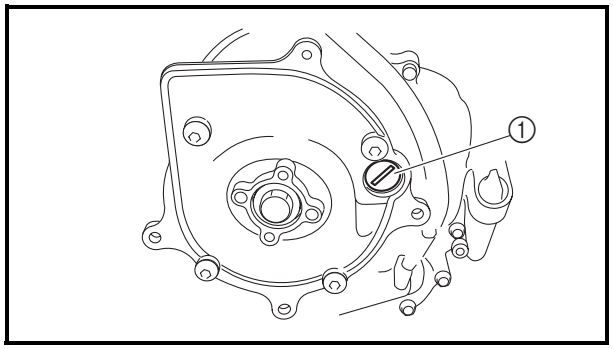




6. Remove:
   - air shroud 1 ①



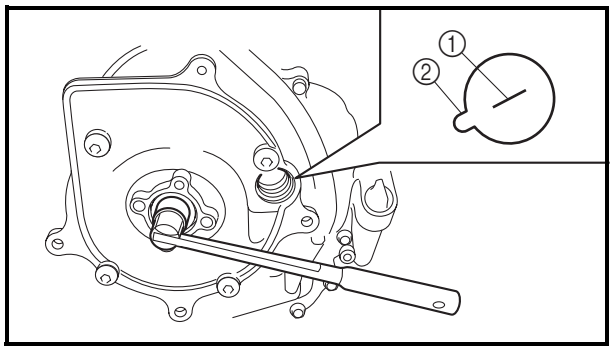
7. Remove:
   • engine cooling fan ①



8. Remove:
   • timing plug ①

9. Check:
   • valve clearance
   Out of specification → Adjust.

Valve clearance (cold)
Intake
0.10 ~ 0.15 mm
(0.0039 ~ 0.0059 in)
Exhaust
0.15 ~ 0.20 mm
(0.0059 ~ 0.0079 in)



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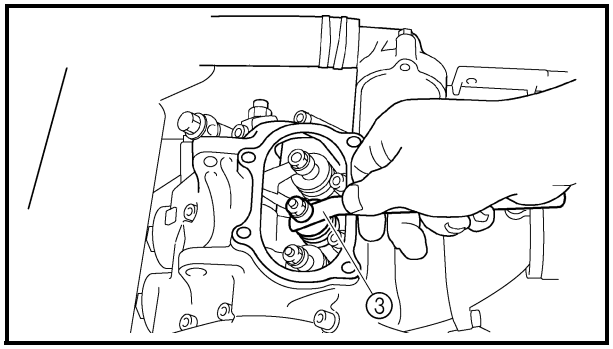
a. Turn the crankshaft counterclockwise with a wrench.
b. Align the "I" mark ① on the rotor with the stationary pointer ② on the A.C. magneto cover. When the "I" mark is aligned with the stationary pointer, the piston is at the Top Dead Center (TDC).

NOTE:
- When the piston is at the Top Dead Center (TDC) on the compression stroke, there should be clearance between the valve stem tips and their respective rocker arm adjusting screws.
- If there is no clearance, rotate the crankshaft counterclockwise one turn.



c. Measure the valve clearance using a thickness gauge ③.

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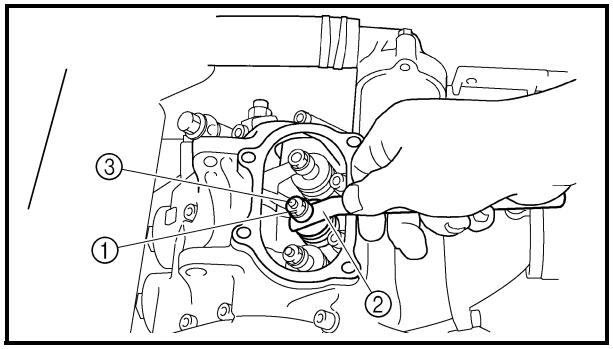

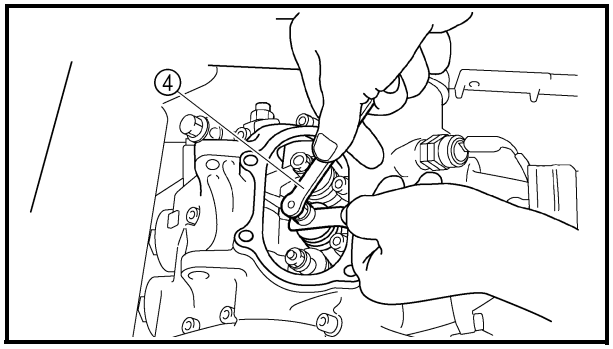

10.Adjust:
- valve clearance

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a. Loosen the locknut ①.
b. Insert a thickness gauge ② between the adjuster end and the valve end.
c. Turn the adjuster ③ clockwise or counterclockwise with the tappet adjusting tool ④ until the proper clearance is obtained.

	Tappet adjusting tool **P/N. YM-08035-A, 90890-01311**

d. Hold the adjuster to prevent it from moving and then tighten the locknut.

	Locknut **14 Nm (1.4 m · kg, 10 ft · lb)**

e. Measure the valve clearance.
f. If the clearance is incorrect, repeat the above steps until the proper clearance is obtained.

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11.Install:
- all removed parts

NOTE:
Install all removed parts in the reverse order of their disassembly. Note the following points.

12.Install:
- engine cooling fan

7 Nm (0.7 m · kg, 5.1 ft · lb)

13.Install:
- air shroud 1

10 Nm (1.0 m · kg, 7.2 ft · lb)

14.Install:
- spark plug

18 Nm (1.8 m · kg, 13 ft · lb)

- tappet covers (exhaust)

12 Nm (1.2 m · kg, 8.7 ft · lb)

- tappet cover (intake)

10 Nm (1.0 m · kg, 7.2 ft · lb)

15.Lower the cargo bed.
16.Install:
- console
- passenger seat
- driver seat

  Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.

ADJUSTING THE TIMING CHAIN

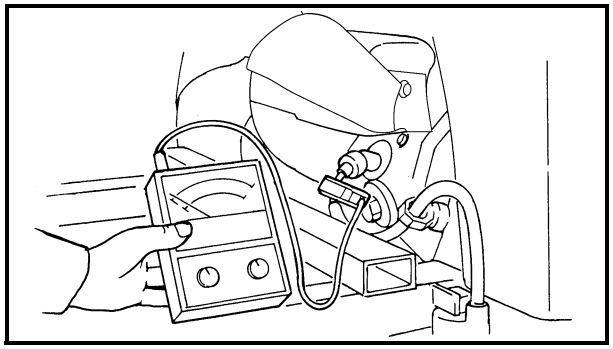
Adjustment free.

ADJUSTING THE IDLING SPEED

1. Start the engine and let it warm up for several minutes.
2. Remove:
   - driver seat
   - passenger seat
   - console

   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
3. Lift the cargo bed up.
4. Attach:
   - tachometer

   (to the spark plug lead)



Digital engine test tachometer
P/N. YU-8036-C
Engine tachometer
P/N. 90890-03113

5. Check:
   - engine idling speed

   Out of specification → Adjust.

Engine idling speed
1,450 ~ 1,550 r/min

6. Adjust:
   - engine idling speed

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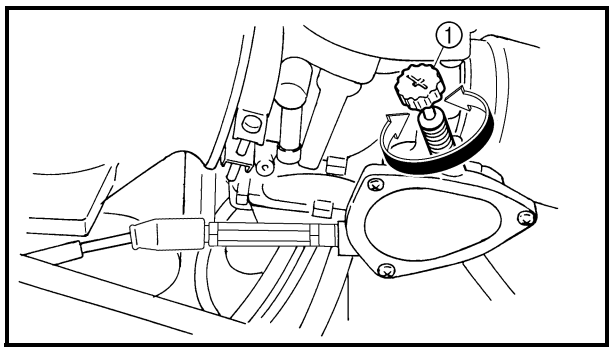
a. Turn the throttle stop screw ① in or out until the specified idling speed is obtained.



Turning in	**Idling speed becomes higher.**
Turning out	**Idling speed becomes lower.**

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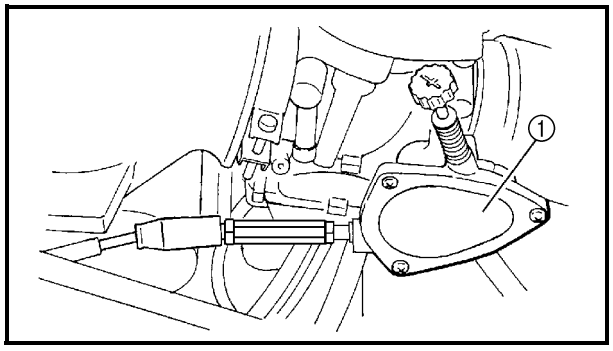
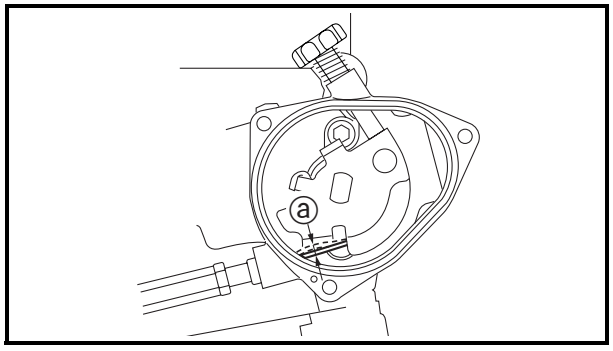
7. Detach:
   • tachometer
8. Lower the cargo bed.
9. Install:
   • console
   • passenger seat
   • driver seat
   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.

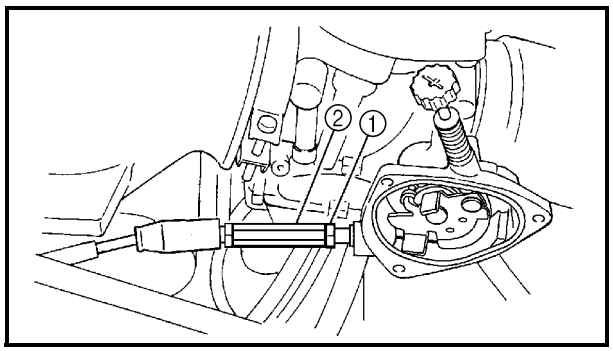


ADJUSTING THE THROTTLE CABLE

NOTE:
Throttle cable free play should be adjusted properly before adjusting the engine idling speed.

1. Remove:
   • driver seat
   • passenger seat
   • console
2. Remove:
   • throttle valve cover ①
3. Check:
   • throttle cable ⓐ
   Slack → Remove the slack.





4. Adjust:
   • throttle cable

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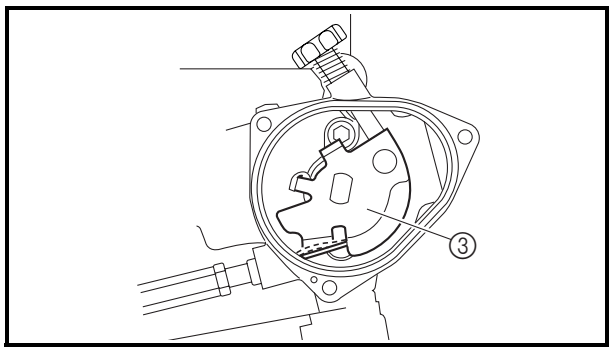
a. Loosen the locknut ①.
b. Turn the adjuster ② in or out until there is no slack.

Turning in	**Slack is increased.**
Turning out	**Slack is decreased.**

c. Tighten the locknut.

NOTE:
After adjusting the throttle cable, depress the accelerator pedal a few times and make sure that the throttle valve ③ closes completely after releasing the accelerator pedal.



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5. Remove:
   • throttle valve cover
6. Install:
   • console
   • passenger seat
   • driver seat

ADJUSTING THE STARTER CABLE

1. Remove:
   • driver seat
   • passenger seat
   • console
   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
2. Adjust:
   • starter cable

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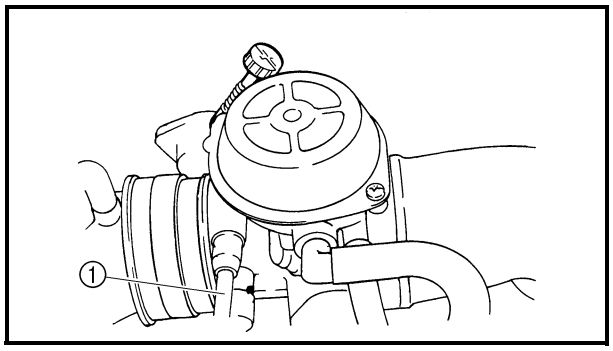
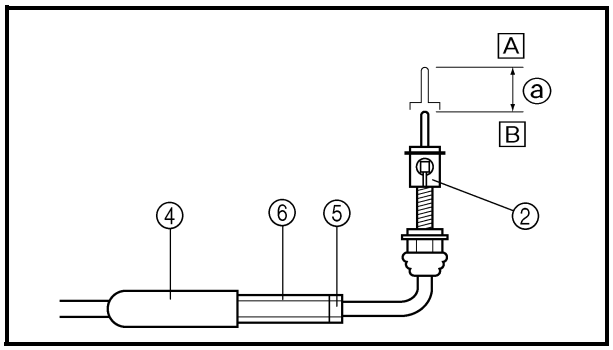


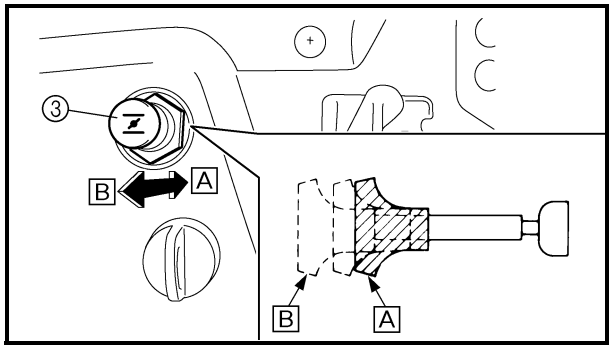
a. Disconnect the starter cable ① from the carburetor body.

NOTE:
Do not remove the starter plunger ② from the starter cable.



b. Measure the starter plunger stroke distance ⓐ of the starter (choke) knob ③ fully close to fully open position. If the distance is out of specification adjust it as described below.

Starter plunger stroke distance
13 mm (0.51 in)



A Fully closed position
B Fully open position

c. Pull back the boot ④.
d. Loosen the locknut ⑤.
e. Turn the adjuster ⑥ in or out until the correct distance is obtained.

Turning in	**Distance increased.**
Turning out	**Distance decreased.**

f. Tighten the locknut ⑤.
g. Push in the boot ④.
h. Connect the starter cable to the carburetor.

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3. Install:
   - console
   - passenger seat
   - driver seat

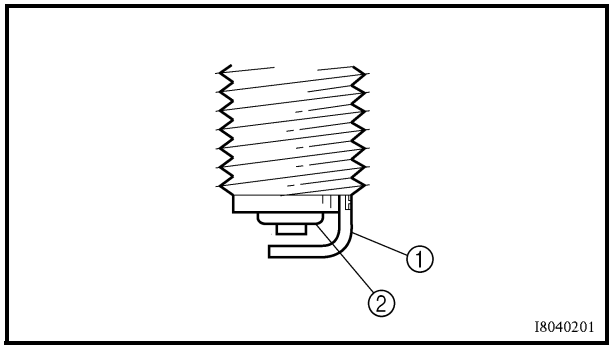
   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.

CHECKING THE SPARK PLUG

1. Lift the cargo bed up.
2. Remove:
   - spark plug
3. Check:
   - spark plug type

   Incorrect → Replace.

Standard spark plug
DPR8EA-9/NGK

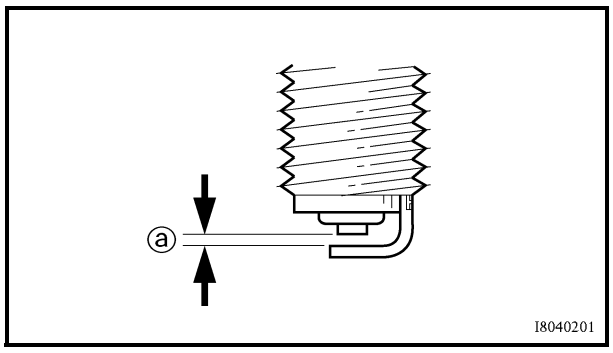


4. Check:
   - electrode ①

     Wear/damage → Replace.
   - insulator ②

     Abnormal color → Replace.

     Normal color is a medium-to-light tan color.
5. Clean the spark plug with a spark plug cleaner or wire brush.



6. Measure:
   - spark plug gap ⓐ

     Use a wire gauge or thickness gauge.

     Out of specification → Regap.

Spark plug gap
0.8 ~ 0.9 mm (0.031 ~ 0.035 in)

7. Install:
   - spark plug — **18 Nm (1.8 m · kg, 13 ft · lb)**

NOTE:

Before installing a spark plug, clean the gasket surface and plug surface.

8. Lower the cargo bed.

CHECKING THE IGNITION TIMING

NOTE:

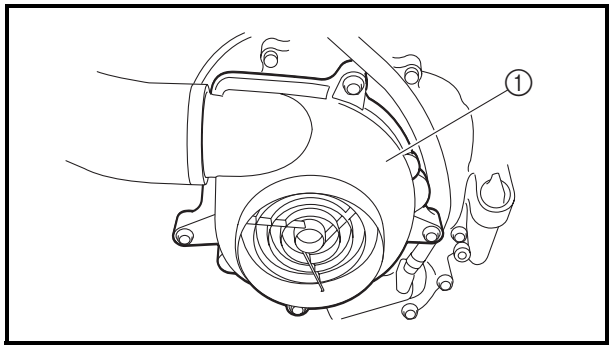
Engine idling speed and throttle cable free play should be adjusted properly before checking the ignition timing.

1. Remove:
   - driver seat
   - passenger seat
   - console

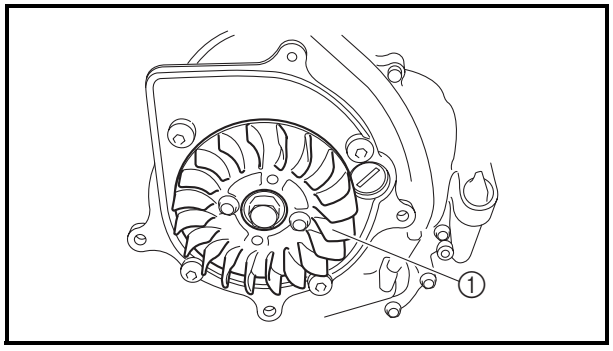
   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
2. Lift the cargo bed up.
3. Attach:
   - tachometer
   - timing light

   (to the spark plug lead)

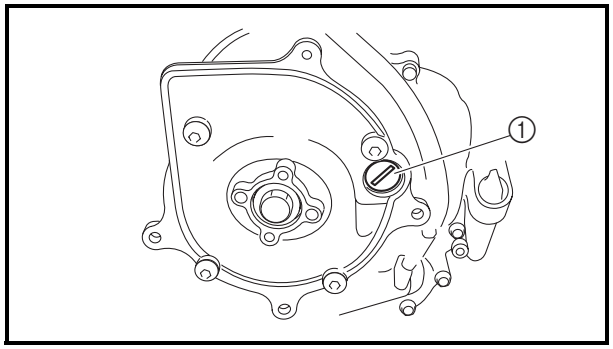
Digital engine test tachometer
P/N. YU-8036-C
Engine tachometer
P/N. 90890-03113
Timing light
P/N. 90890-03141
Battery powered timing light
P/N. YM-33277-A

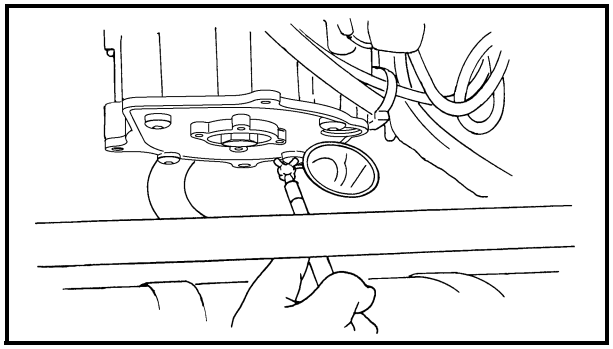


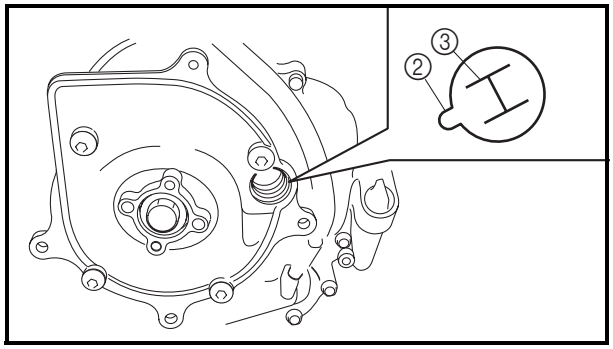
4. Remove:
   - air shroud 1 ①



5. Remove:
   - engine cooling fan ①







6. Check:
   • ignition timing

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a. Warm up the engine and keep it at the specified speed.

	Engine speed **1,450 ~ 1,550 r/min**

b. Remove the timing plug ①.
c. Visually check the stationary pointer ② to verify it is within the required firing range ③ indicated on the flywheel.
   Incorrect firing range → Check the pulser coil assembly.
d. Install the timing plug.

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7. Install:
   • engine cooling fan

	7 Nm (0.7 m · kg, 5.1 ft · lb)

8. Install:
   • air shroud 1

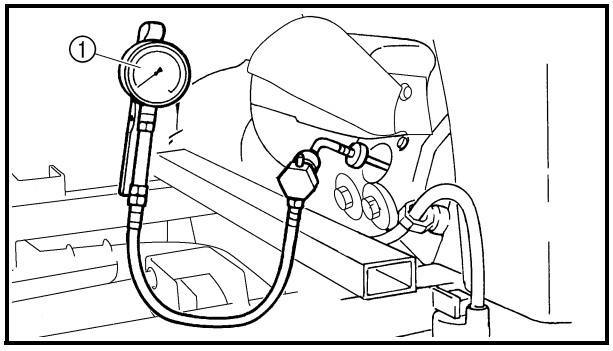
	10 Nm (1.0 m · kg, 7.2 ft · lb)

9. Detach:
   • timing light
   • tachometer
10. Lower the cargo bed.
11. Install:
   • console
   • passenger seat
   • driver seat
   Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.

MEASURING THE COMPRESSION PRESSURE

NOTE:
Insufficient compression pressure will result in a loss of performance.

1. Check:
   • valve clearance
   Out of specification → Adjust.
   Refer to “ADJUSTING THE VALVE CLEARANCE”.
2. Start the engine and let it warm up for several minutes.
3. Stop the engine.
4. Lift the cargo bed up.



5. Remove:
   • spark plug
6. Attach:
   • adapter
   • compression gauge ①

Compression gauge
P/N. YU-33223, 90890-03081
Adapter
P/N. YU-33223-4, 90890-04082

7. Measure:
   • compression pressure
   Above the maximum pressure:
   Check the cylinder head, valve surfaces, and piston crown for carbon deposits.
   Below the minimum pressure:
   Squirt a few drops of oil into the affected cylinder and measure again.
   Refer to the table below.

Compression pressure (with oil introduced into cylinder)	
Reading	**Diagnosis**
Higher than without oil	**Worn or damaged pistons**
Same as without oil	**Defective ring(s), valves, cylinder head gasket or piston is possible.**

Compression pressure
(at sea level)
Standard:
1,324 kPa
(13.24 kg/cm², 188.31 psi)
Minimum:
1,150 kPa
(11.5 kg/cm², 163.57 psi)
Maximum:
1,480 kPa
(14.8 kg/cm², 210.50 psi)

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a. Crank over the engine with the electric starter (be sure the battery is fully charged) with the throttle wide-open until the compression reading on the gauge stabilizes.

⚠ WARNING

When cranking the engine, ground the spark plug lead to prevent sparking.

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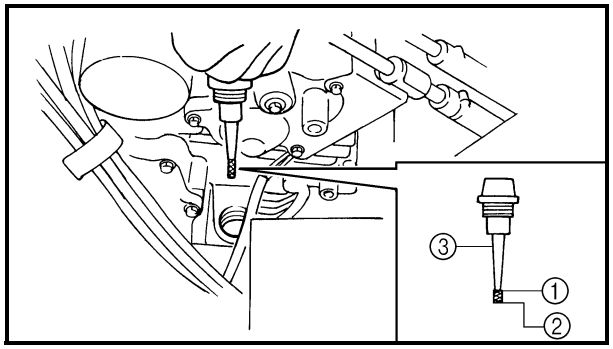
8. Install:
   - spark plug — **18 Nm (1.8 m · kg, 13 ft · lb)**
9. Lower the cargo bed.

CHECKING THE ENGINE OIL LEVEL

1. Place the vehicle on a level surface.
2. Remove:
   - driver seat
   - passenger seat
   - console

   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.

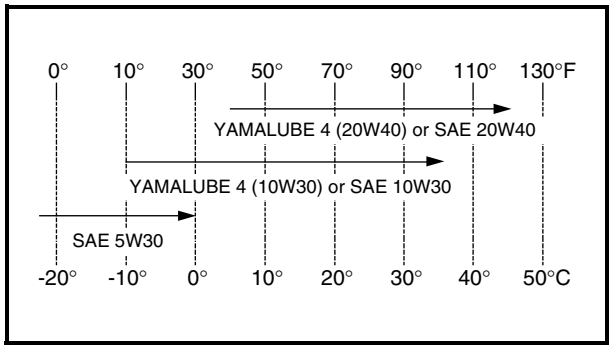


3. Check:
   - engine oil level

   Oil level should be between the maximum ① and minimum ② marks.
   Oil level low → Add oil to the proper level.

NOTE:

Do not screw the dipstick ③ in when checking the oil level.



Recommended oil
Follow the left chart.

NOTE:

Recommended oil classification:
API Service "SE", "SF", "SG" type or equivalent (e.g. "SF—SE—CC", "SF—SE—SD" etc.)

CAUTION:

Do not allow foreign material to enter the crankcase.

4. Start the engine and let it warm up for several minutes.

5. Stop the engine and check the oil level again.

NOTE:
Wait a few minutes until the oil settles before checking the oil level.

⚠ WARNING

Never remove the dipstick just after high speed operation because the heated oil could spurt out. Wait until the oil cools down before removing the dipstick.

6. Install:
   - console
   - passenger seat
   - driver seat

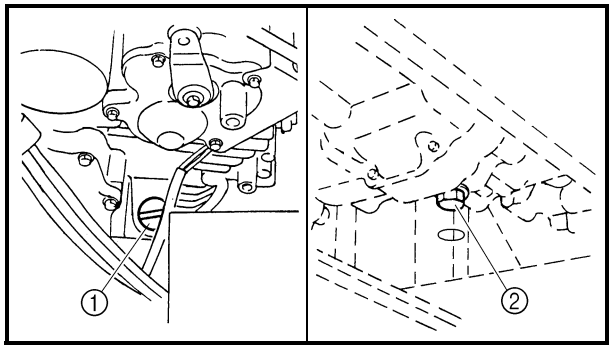
   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.

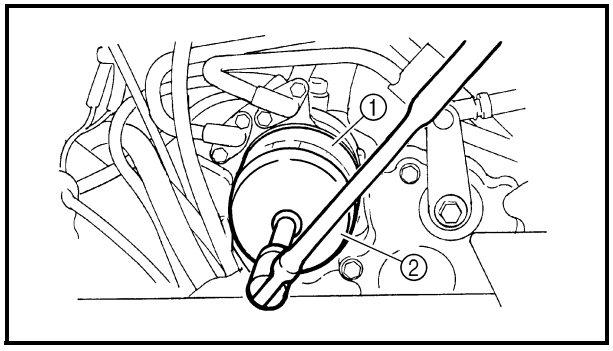
CHANGING THE ENGINE OIL

1. Start the engine and let it warm up for several minutes.
2. Stop the engine and place an oil pan under the engine.
3. Remove:
   - driver seat
   - passenger seat
   - console

   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
4. Remove:
   - engine oil filler plug (dipstick) ①
   - engine oil drain bolt ②

   Drain the engine oil from the crankcase.





5. If the oil filter cartridge is also to be replaced, perform the following procedure.

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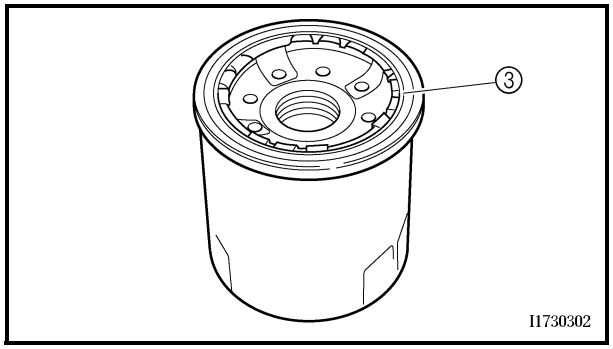
a. Remove the oil filter cartridge ① with an oil filter wrench ②.

	Oil filter wrench **P/N. YU-38411, 90890-01426**



b. Lubricate the O-ring ③ of the new oil filter cartridge with a thin coat of lithium-soap-based grease.

CAUTION:

Make sure that the O-ring ③ is positioned correctly in the groove of the oil filter cartridge.

c. Tighten the new oil filter cartridge to specification with an oil filter wrench.

Oil filter cartridge
17 Nm (1.7 m · kg, 12 ft · lb)

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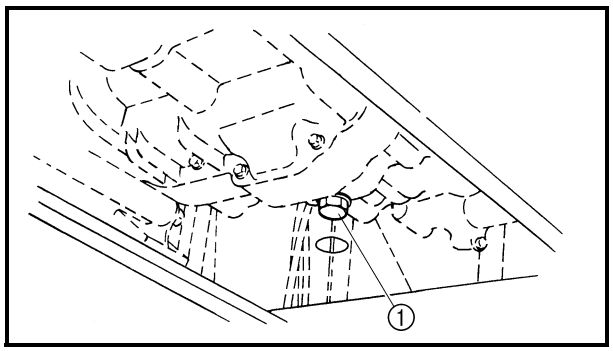


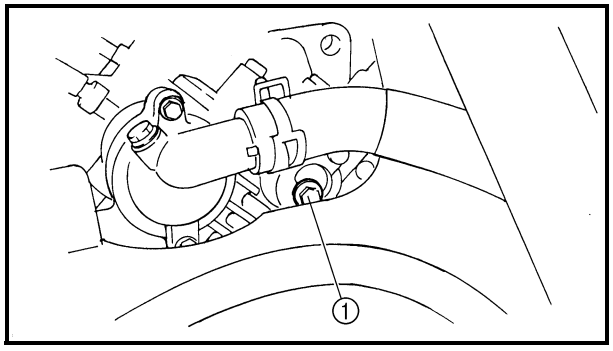
6. Install:
   • engine oil drain bolt ①

30 Nm (3.0 m · kg, 22 ft · lb)

7. Fill:
   • crankcase
   (with sufficient oil to reach the specified level)
   Refer to “CHECKING THE ENGINE OIL LEVEL”.

Oil quantity
Periodic oil change
2.10 L (1.85 Imp qt, 2.22 US qt)
With oil filter replacement
2.20 L (1.94 Imp qt, 2.33 US qt)
Total amount
2.40 L (2.11 Imp qt, 2.54 US qt)

8. Install:
   • engine oil filler plug
9. Warm up the engine for a few minutes, then stop the engine.
10. Check:
   • engine
   (for engine oil leaks)
   • oil level
   Refer to “CHECKING THE ENGINE OIL LEVEL”.



11.Check:
- engine oil pressure

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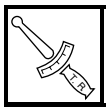
a. Slightly loosen the oil gallery bolt ①.
b. Start the engine and keep it idling until engine oil starts to seep from the oil gallery bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
c. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to "CRANKSHAFT AND OIL PUMP" in chapter 4.
d. Start the engine after solving the problem(s) and check the engine oil pressure again.
e. Tighten the oil gallery bolt to specification.

	**Oil gallery bolt** **7 Nm (0.7 m · kg, 5.1 ft · lb)**

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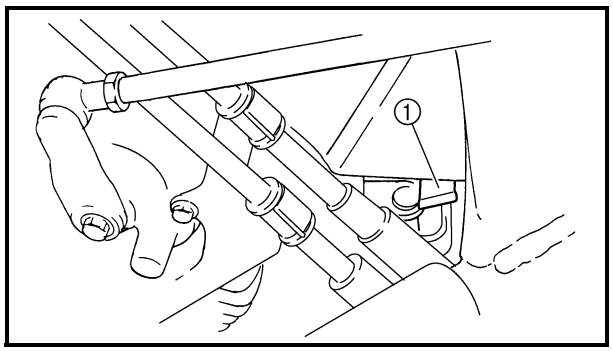
12.Install:
- console
- passenger seat
- driver seat

  Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.



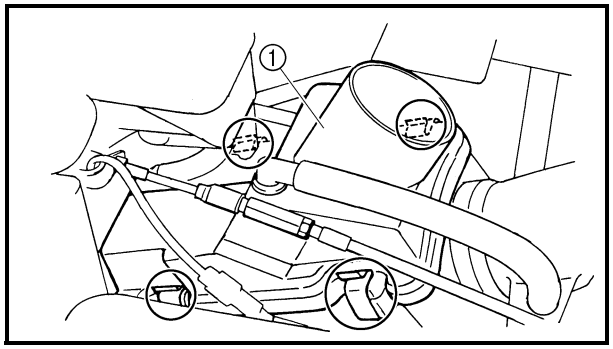
CLEANING THE AIR FILTER

NOTE:

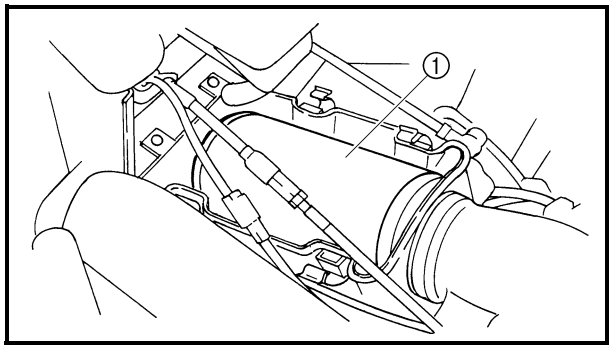
There is a check hose ① at the bottom of the air filter case. If dust and/or water collects in this hose, clean the air filter element and air filter case.

1. Remove:
   - driver seat
   - passenger seat
   - console

   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.



2. Remove:
   • air filter case cover ①

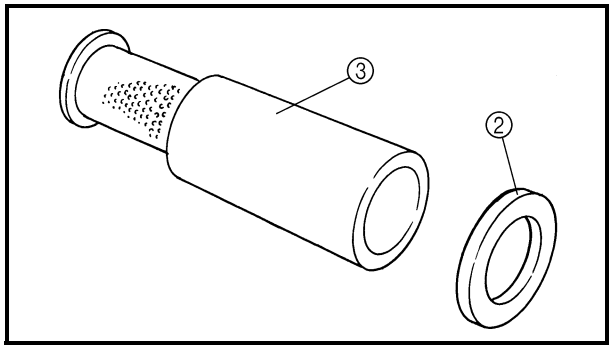


3. Remove:
   • air filter element assembly ①
   • air filter element cap
   • air filter element

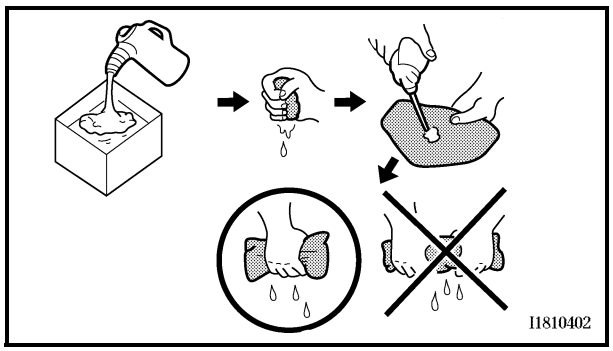
② Air filter element cap
③ Air filter element

CAUTION:

Never operate the engine with the air filter element removed. This will allow unfiltered air to enter, causing rapid wear and possible engine damage. Additionally, operation without the filter element will affect carburetor tuning with subsequent poor performance and possible engine overheating.



4. Check:
   • air filter element
   Damaged → Replace.



5. Clean:
   • air filter element

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a. Wash the element gently, but thoroughly in solvent.

⚠ WARNING

Use a cleaning solvent which is designed to clean parts only. Never use gasoline or low flash point solvents as they may cause a fire or explosion.

b. Squeeze the excess solvent out of the element and let it dry.

CAUTION:

Do not twist or wring out the element. This could damage the foam material.

c. Apply Yamaha foam air filter oil or other quality foam air filter oil.
d. Squeeze out the excess oil.

NOTE:
The element should be wet but not dripping.

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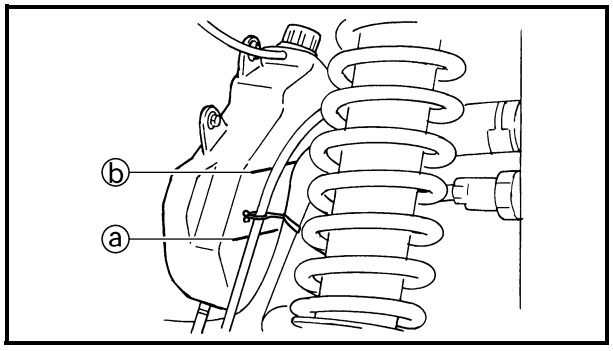
6. Install:
   - air filter element
   - air filter case cover

NOTE:
To prevent air leaks make sure that the sealing surface of the element matches the sealing surface of the case.

7. Install:
   - console
   - passenger seat
   - driver seat

   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.



CHECKING THE COOLANT LEVEL

1. Place the vehicle on a level surface.
2. Lift the hood up.
3. Check:
   - coolant level

   The coolant level should be between the minimum level mark ⓐ and maximum level mark ⓑ.

   Below the minimum level mark → Add the recommended coolant to the proper level.

CAUTION:

- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant, check and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, soft water may be used if distilled water is not available.**

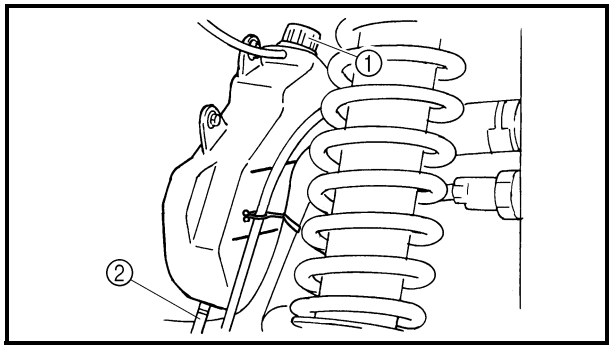
4. Start the engine, warm it up for several minutes, and then turn it off.
5. Check:
   • coolant level

NOTE:
Before checking the coolant level, wait a few minutes until the coolant has settled.

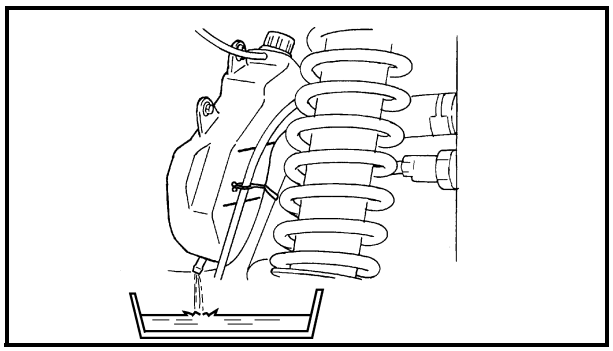
6. Close the hood.

CHANGING THE COOLANT

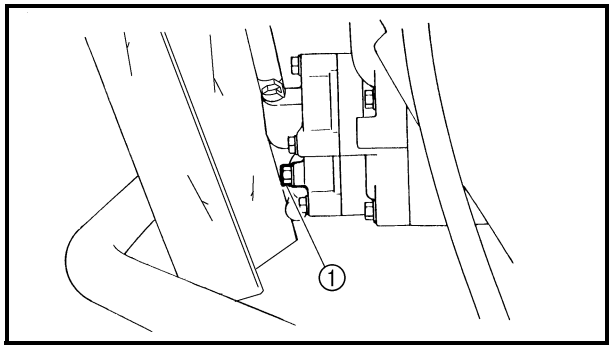
1. Remove:
   • driver seat
   • passenger seat
   • console
   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
2. Lift the hood up.



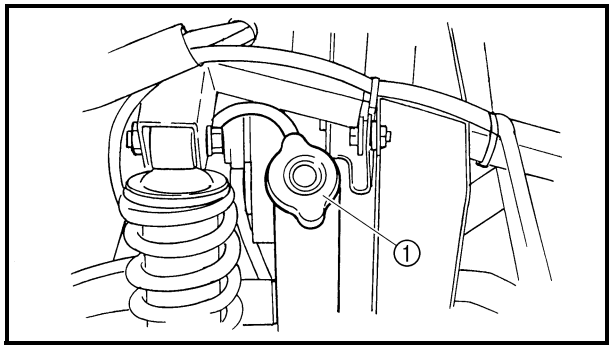
3. Remove:
   • coolant reservoir cap ①
4. Disconnect:
   • coolant reservoir hose ②



5. Drain:
   • coolant
   (from the coolant reservoir)
6. Connect:
   • coolant reservoir hose



7. Remove:
   • coolant drain bolt (water pump) ①
   (along with the copper washer)

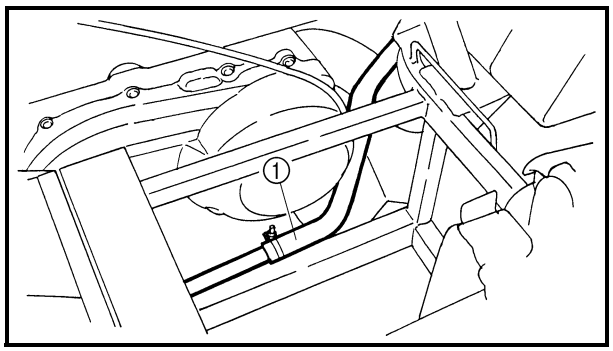


8. Remove:
   • radiator cap ①

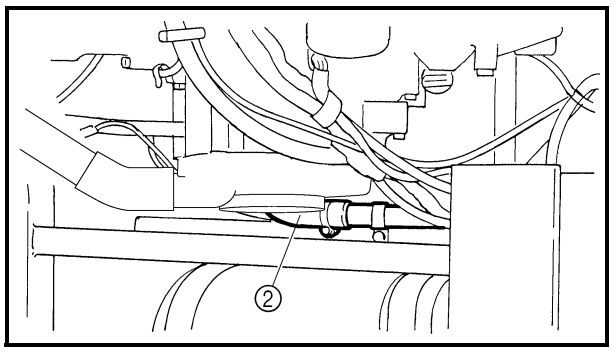
⚠ WARNING

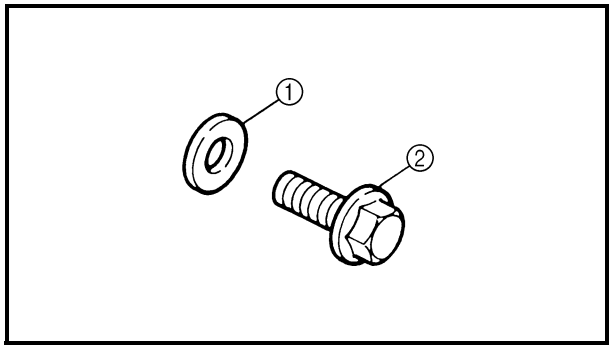
A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:
Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, turn the radiator cap counterclockwise while pressing down on it and then remove it.

9. Drain:
   • coolant



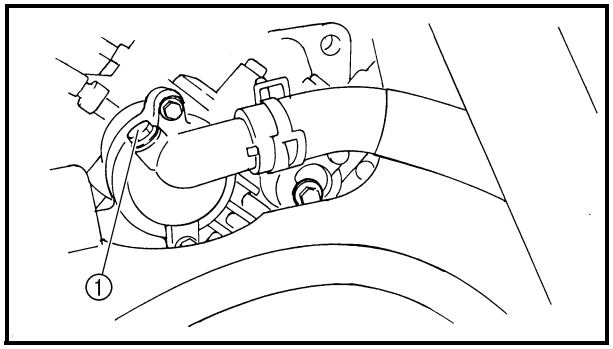
10. Disconnect:
   • coolant outlet hose ①
   • water pump inlet hose ②
11. Drain:
   • coolant





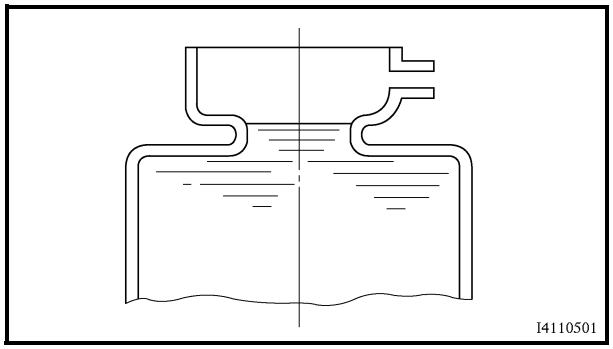
12. Check:
   • copper washer ①
   • coolant drain bolt ②
     Damage → Replace.
13. Install:
   • coolant drain bolt (water pump)

10 Nm (1.0 m · kg, 7.2 ft · lb)



14.Connect:
- water pump inlet hose
- coolant outlet hose

15.Remove:
- air bleed bolt ①



16.Fill:
- cooling system
  (with the specified amount of the recommended coolant)

Recommended antifreeze
High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines
Mixing ratio
1 : 1 (antifreeze : water)
Quantity
Total amount
2.5 L (2.20 Imp qt, 2.64 US qt)
Coolant reservoir capacity
0.35 L (0.31 Imp qt, 0.37 US qt)

NOTE:
The specified amount of coolant is a standard amount. Fill the cooling system with coolant until coolant comes out of the hole for the air bleed bolt.

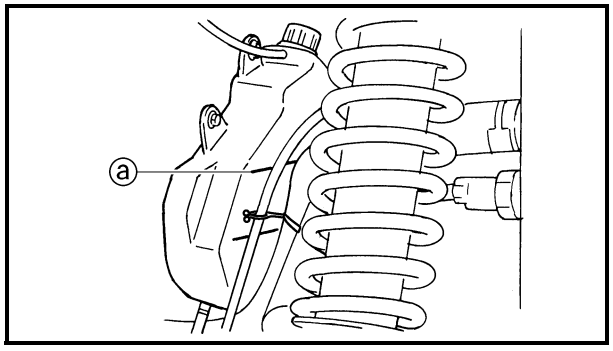
Handling notes for coolant
Coolant is potentially harmful and should be handled with special care.

⚠ WARNING
- **If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.**
- **If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.**
- **If coolant is swallowed, induce vomiting and get immediate medical attention.**

CAUTION:

- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant, check, and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, soft water may be used if distilled water is not available.**
- **If coolant comes into contact with painted surfaces, immediately wash them with water.**
- **Do not mix different types of antifreeze.**

17. Install:
    - air bleed bolt — **9 Nm (0.9 m · kg, 6.5 ft · lb)**
18. Install:
    - radiator cap

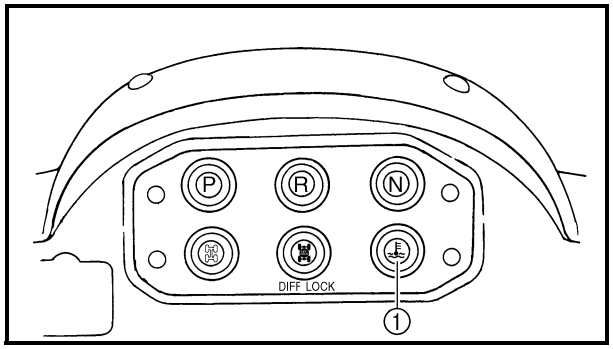


19. Fill:
    - coolant reservoir
      (with the recommended coolant to the maximum level mark ⓐ)
20. Install:
    - coolant reservoir cap
21. Start the engine, warm it up for several minutes, and then turn it off.
22. Check:
    - coolant level
      Refer to "CHECKING THE COOLANT LEVEL".

NOTE:

Before checking the coolant level, wait a few minutes until the coolant has settled.

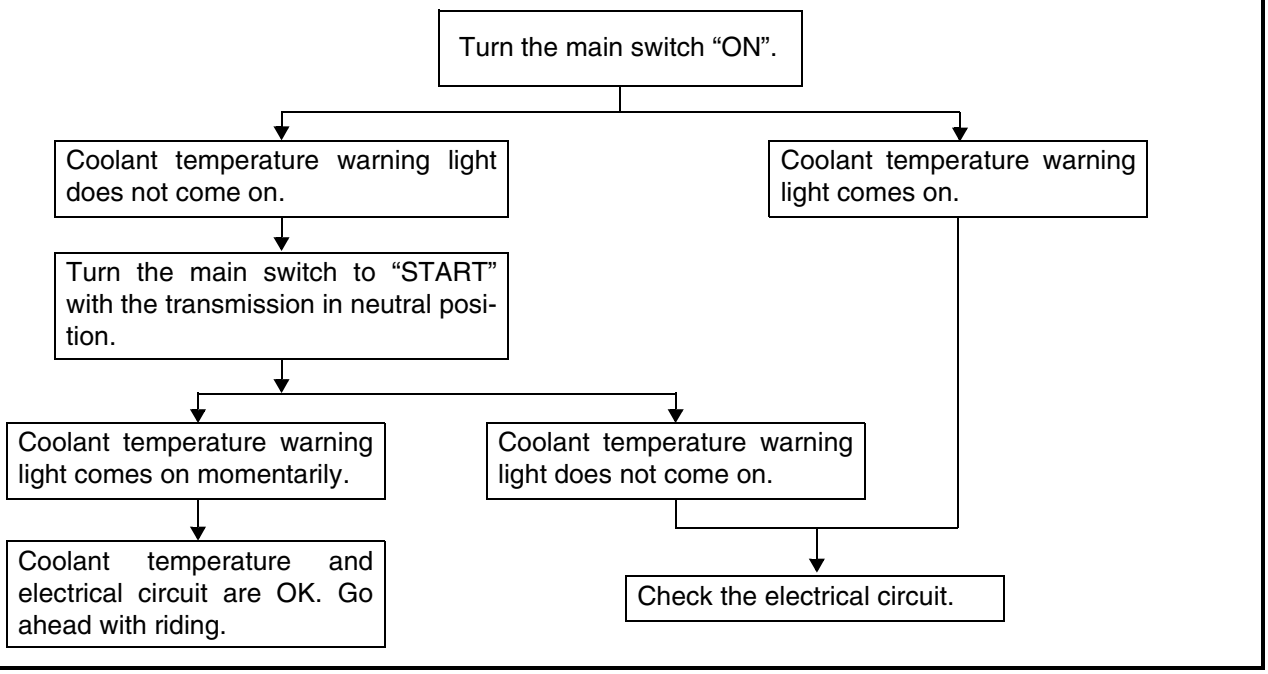
23. Close the hood.
24. Install:
    - console
    - passenger seat
    - driver seat
      Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.



CHECKING THE COOLANT TEMPERATURE WARNING LIGHT

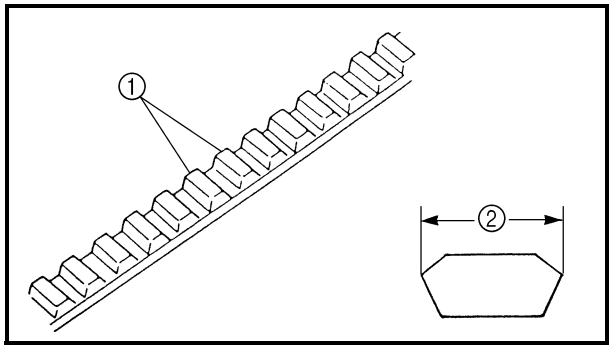
① Coolant temperature indicator light

Coolant temperature warning light checking method


Turn the main switch “ON”.
Coolant temperature warning light does not come on.
Coolant temperature warning light comes on.
Turn the main switch to “START” with the transmission in neutral position.
Coolant temperature warning light comes on momentarily.
Coolant temperature warning light does not come on.
Coolant temperature and electrical circuit are OK. Go ahead with riding.
Check the electrical circuit.

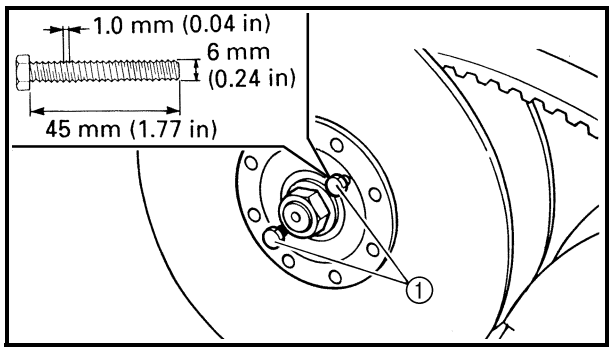
CHECKING THE V-BELT

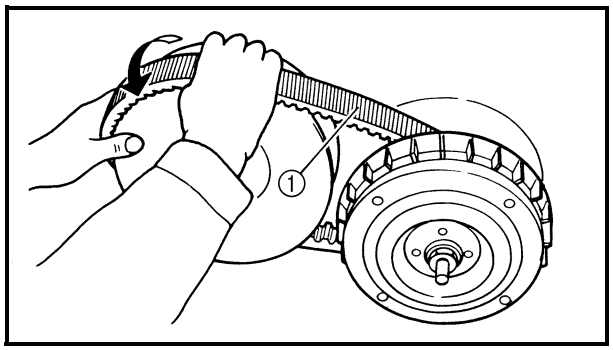
1. Remove:
   - driver seat
   - passenger seat
   - console
     Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.
   - drive belt cover
     Refer to “PRIMARY AND SECONDARY SHEAVES” in chapter 4.

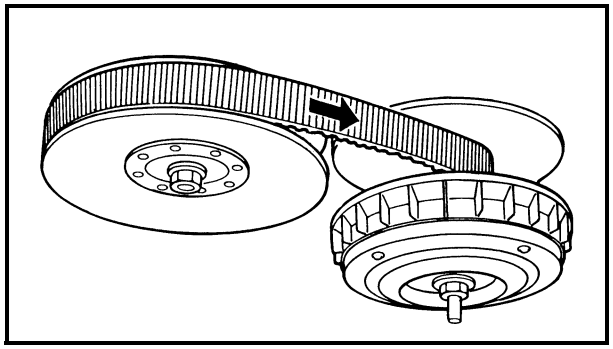


2. Check:
   - V-belt ①
     Cracks/wear/scaling/chipping → Replace.
     Oil/grease → Check primary sheave and secondary sheave.
3. Measure:
   - V-belt width ②
     Out of specification → Replace.

V-belt width
33.2 mm (1.31 in)
<Limit:> 29.9 mm (1.18 in)







4. Replace:
   - V-belt

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a. Install the bolts ① (90101-06016) into the secondary fixed sheave hold.

NOTE:
Tightening the bolts ① will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.

b. Remove the V-belt ① from the primary sheave and secondary sheave.
c. Install the V-belt.

NOTE:
Install the V-belt so that its arrow faces the direction shown in the illustration.

d. Remove the bolts.

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5. Remove:
   - drive belt cover
     Refer to "PRIMARY AND SECONDARY SHEAVES" in chapter 4.
   - console
   - passenger seat
   - driver seat
     Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.

CLEANING THE SPARK ARRESTER

1. Clean:
   - spark arrester

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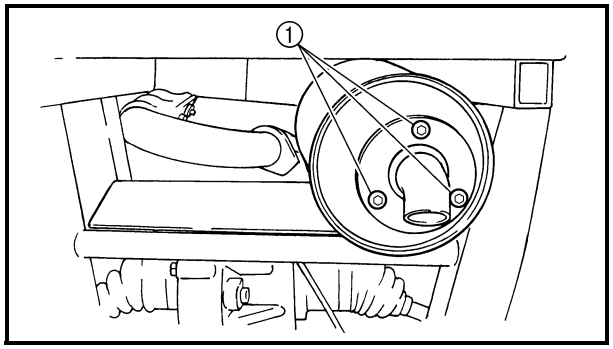
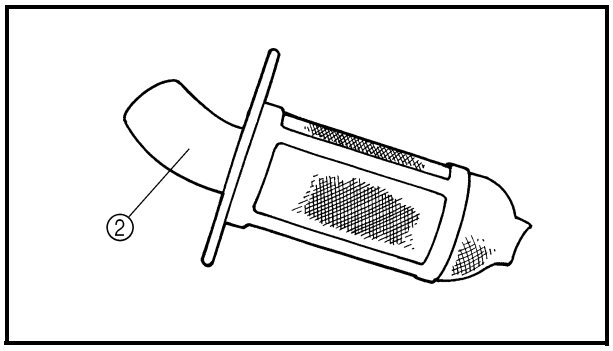
⚠ WARNING

- **Select a well-ventilated area free of combustible materials.**
- **Always let the exhaust system cool before performing this operation.**
- **Do not start the engine when removing the tailpipe from the muffler.**





a. Remove the bolts ①.
b. Remove the tailpipe ② by pulling it out of the muffler.
c. Tap the tailpipe lightly with a soft-face hammer or suitable tool, then use a wire brush to remove any carbon deposits from the spark arrester portion of the tailpipe and the inner contact surfaces of the muffler.
d. Insert the tailpipe ② into the muffler and align the bolt holes.
e. Insert the bolt ① and tighten it.
f. Start the engine and rev it up approximately twenty times while momentarily creating exhaust system back pressure by blocking the end of the muffler with a shop towel.
g. Stop the engine and allow the exhaust pipe to cool.

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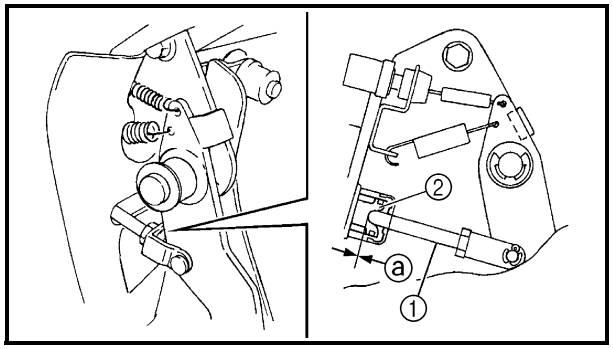


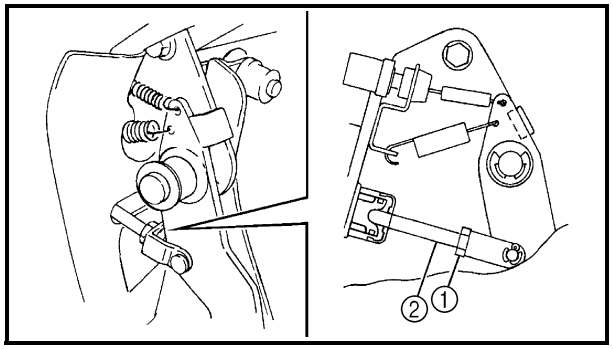
CHASSIS

ADJUSTING THE BRAKE PEDAL

1. Check:
   • brake pedal free play ⓐ
   Out of specification → Adjust.

NOTE:
The end of the brake rod ① should lightly contact the brake master cylinder ②.

Brake pedal free play
0 mm (0.0 in)



2. Adjust:
   • brake pedal free play

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a. Loosen the locknut ①.
b. Turn brake rod ② in or out until the correct free play is obtained.

Turning in	**Free play is increased.**
Turning out	**Free play is decreased.**

c. Tighten the locknut to specification.

Locknut
17 Nm (1.7 m · kg, 12 ft · lb)

NOTE:
Make sure that there is no brake drag on the front or rear wheels.

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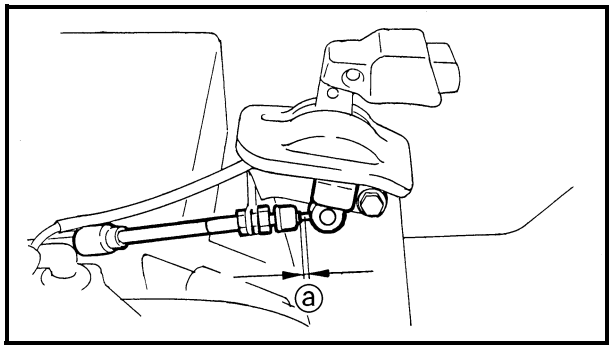
ADJUSTING THE PARKING BRAKE

1. Shift the drive select lever into low gear “L”.
2. Remove:
   - driver seat
   - passenger seat
   - console

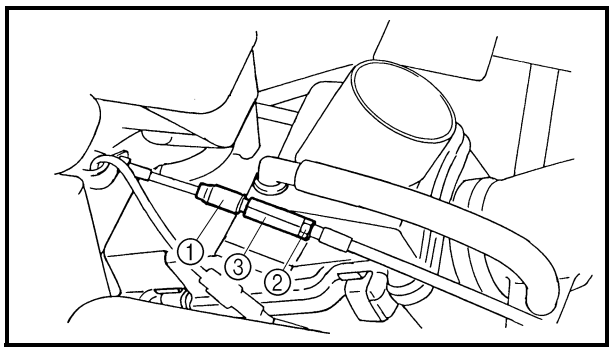
   Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.



3. Check:
   - parking brake cable free play ⓐ

   Out of specification → Adjust.

	Parking brake cable free play **2 ~ 3 mm (0.079 ~ 0.118 in)**



4. Adjust:
   - parking brake cable free play

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a. Pull back the adjuster cover ①.
b. Loosen the locknut ②.
c. Turn the adjuster ③ in or out until the correct free play is obtained.

Turning in	**Free play is increased.**
Turning out	**Free play is decreased.**

d. Tighten the locknut ②.
e. Slide the adjuster cover ① to its original position.

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5. Install:
   - console
   - passenger seat
   - driver seat

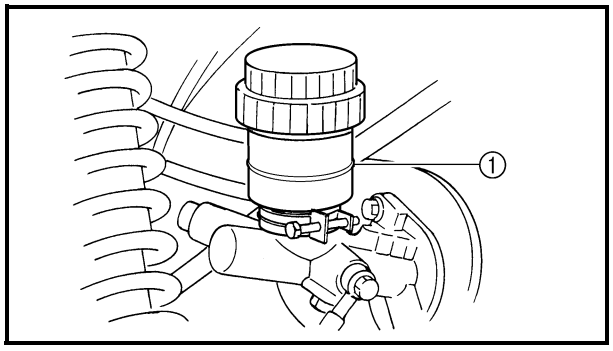
   Refer to “SEATS, ENCLOSURE, HOOD AND CARGO BED” in chapter 8.

CHECKING THE BRAKE FLUID LEVEL

1. Place the vehicle on a level surface.

NOTE:
When checking the brake fluid level, make sure that the top of the brake fluid reservoir top is horizontal.

2. Lift the hood up.



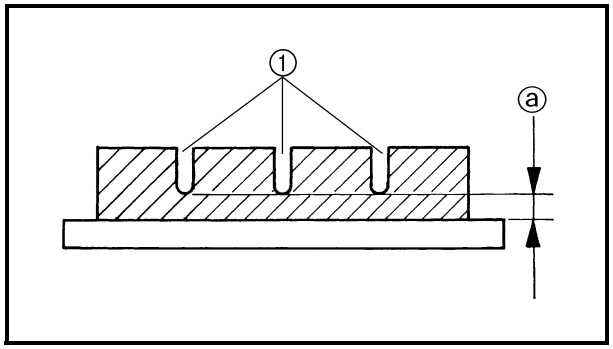
3. Check:
   - brake fluid level
     Fluid level is under "MIN" level line ① → Fill up.

Recommended brake fluid
DOT 4

CAUTION:
Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

⚠ WARNING
- **Use only the designed quality brake fluid: otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid; mixing fluids may result in a harmful chemical reaction and lead to poor performance.**
- **Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the fluid and may result in a vapor lock.**

4. Close the hood.



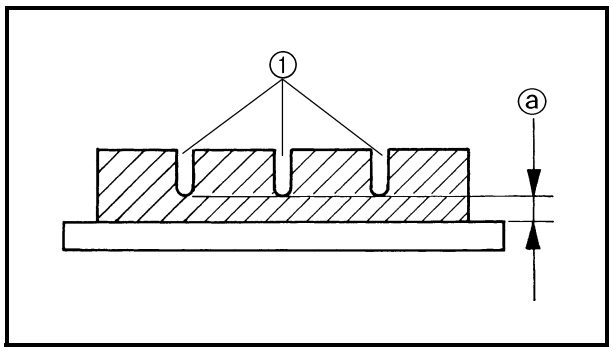
CHECKING THE FRONT BRAKE PADS

1. Remove:
   - front wheels
2. Check:
   - brake pads

   Wear indicator groove ① almost disappeared → Replace the brake pads as a set. Refer to "FRONT AND REAR BRAKES" in chapter 8.

Brake pad wear limit ⓐ
1.5 mm (0.06 in)

3. Operate the brake pedal.
4. Install:
   - front wheels



CHECKING THE REAR BRAKE PADS

1. Check:
   - brake pads

   Wear indicator groove ① almost disappeared → Replace the brake pads as a set. Refer to "FRONT AND REAR BRAKES" in chapter 8.

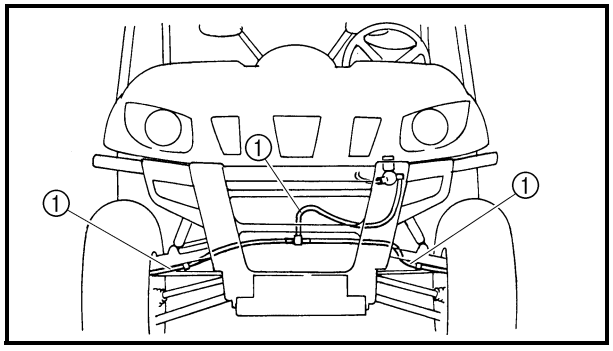
Brake pad wear limit ⓐ
1.5 mm (0.06 in)

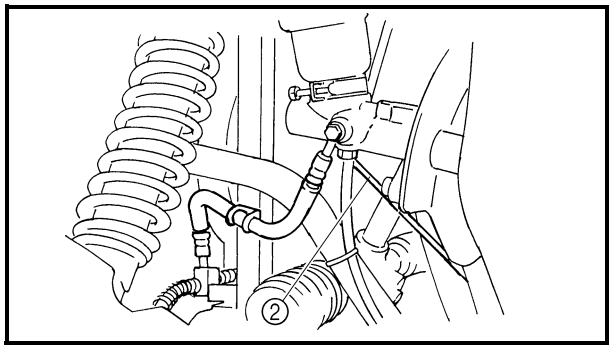
2. Operate the brake pedal.

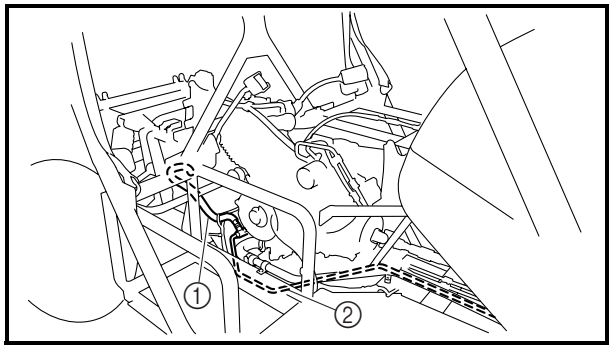
CHECKING THE BRAKE HOSES AND BRAKE PIPES

1. Remove:
   - driver seat
   - passenger seat
   - console

   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.







2. Lift the hood up.
3. Lift the cargo bed.
4. Check:
   - front brake hoses ①
   - rear brake pipes ②
   - rear brake hoses ③

   Cracks/wear/damage → Replace.
   Fluid leakage → Replace all damaged parts.
   Refer to "FRONT AND REAR BRAKES" in chapter 8.

NOTE:
Hold the vehicle in an upright position and apply the brake pedal.

5. Check:
   - brake hose clamps

   Loosen → Tighten.
6. Lower the cargo bed.
7. Close the hood.
8. Install:
   - console
   - passenger seat
   - driver seat

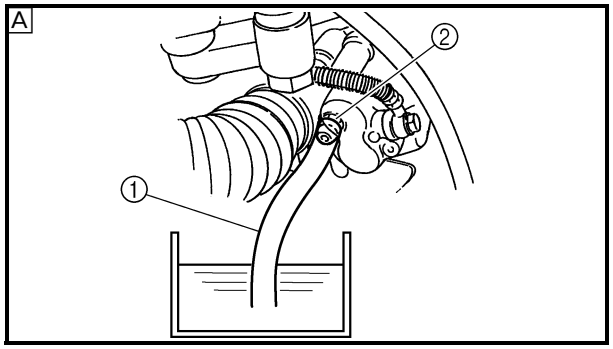
   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.

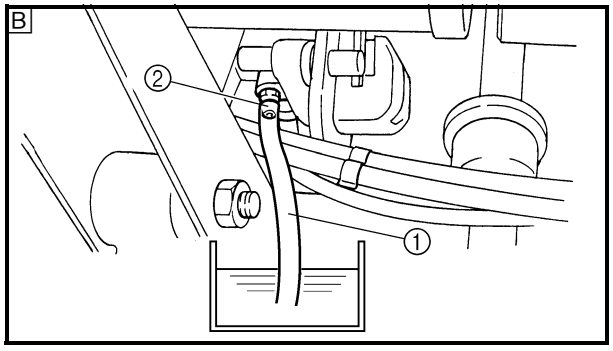
BLEEDING THE HYDRAULIC BRAKE SYSTEM

⚠ WARNING

Bleed the brake system if:
- **The system has been disassembled.**
- **A brake hose or brake pipe have been loosened or removed.**
- **The brake fluid has been very low.**
- **The brake operation has been faulty.**

A loss of braking performance may occur if the brake system is not properly bled.





1. Bleed:
   • brake system

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a. Add the proper brake fluid to the reservoir.
b. Install the diaphragm. Be careful not to spill any fluid or allow the reservoir to overflow.
c. Connect the clear plastic hose ① tightly to the caliper bleed screw ②.
A Front
B Rear
d. Place the other end of the hose into a container.
e. Slowly apply the brake pedal several times.
f. Push down on the pedal and hold it.
g. Loosen the bleed screw and allow the pedal to travel towards its limit.
h. Tighten the bleed screw when the pedal limit has been reached, then release the pedal.
i. Repeat steps (e) to (h) until all the air bubbles have disappeared from the fluid.
j. Tighten the bleed screw.

Front brake caliper bleed screw
6 Nm (0.6 m · kg, 4.3 ft · lb)
Rear brake caliper bleed screw
5 Nm (0.5 m · kg, 3.6 ft · lb)

NOTE:
If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system have disappeared.

k. Add brake fluid to the proper level.
   Refer to “CHECKING THE BRAKE FLUID LEVEL”.

⚠ WARNING

Check the operation of the brake after bleeding the brake system.

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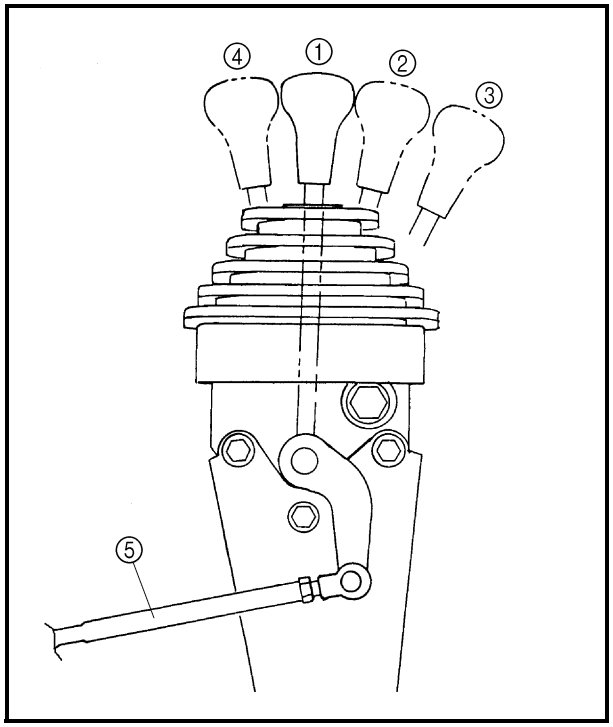
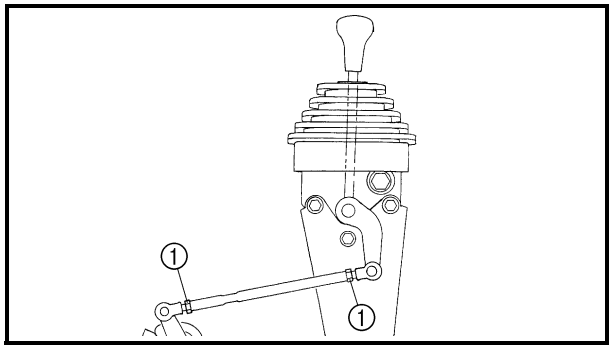


ADJUSTING THE SELECT LEVER SHIFT ROD

① Neutral
② High
③ Low
④ Reverse
⑤ Select lever shift rod

CAUTION:

Before shifting, you must stop the vehicle and take your foot off the accelerator pedal. Otherwise, the transmission may be damaged.



1. Adjust:
   • Select lever shift rod

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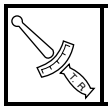
a. Make sure the select lever is in NEUTRAL.
b. Loosen both locknuts ①.

CAUTION:

The select lever shift rod locknut (select lever side) has left-handed threads. To loosen the locknut, turn it clockwise.

c. Adjust the shift rod length for smooth and correct shifting.
d. Tighten the locknuts ①.

	**Locknut** **15 Nm (1.5 m · kg, 11 ft · lb)**

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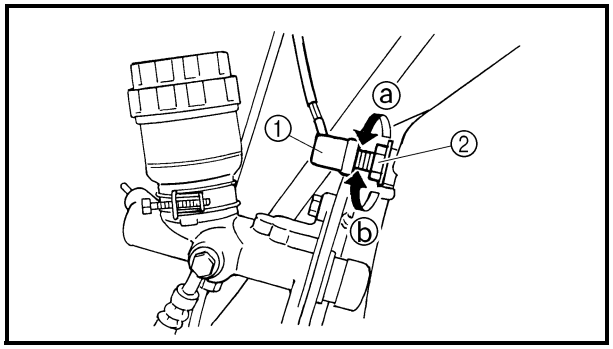
ADJUSTING THE BRAKE LIGHT SWITCH

NOTE:

- The brake light switch is operated by movement of the brake pedal.
- The brake light switch is properly adjusted when the brake light comes on just before the braking effect starts.



1. Check:
   • brake light operation timing
   Incorrect → Adjust.
2. Adjust:
   • brake light operation timing

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a. Hold the main body ① of the brake light switch so that it does not rotate and turn the adjusting nut ② in direction ⓐ or ⓑ until the brake light comes on at the proper time.

Direction ⓐ	**Brake light comes on sooner.**
Direction ⓑ	**Brake light comes on later.**

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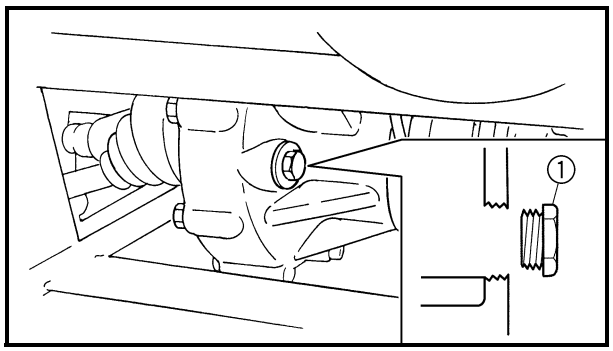


CHECKING THE FINAL GEAR OIL LEVEL

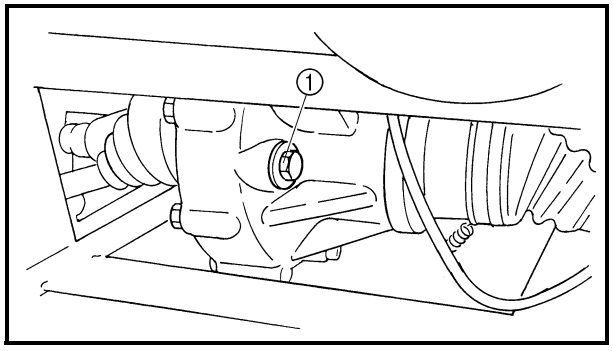
1. Place the vehicle on a level surface.
2. Remove:
   • oil filler plug ①
3. Check:
   • oil level
   Oil level should be up to the brim of the hole.
   Oil level low → Add oil to the proper level.

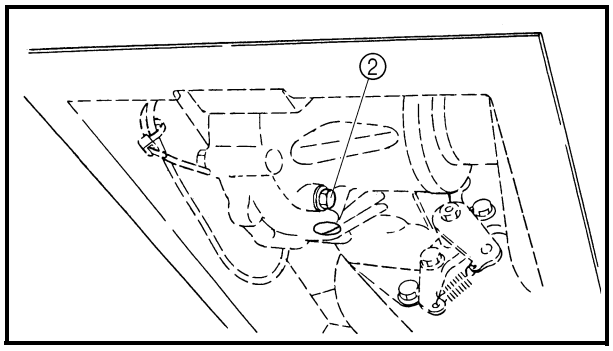
Recommended oil
SAE 80 API "GL-4" Hypoid gear oil

CAUTION:

Take care not allow foreign material to enter the final gear case.

4. Install:
   • oil filler plug — **23 Nm (2.3 m · kg, 17 ft · lb)**





CHANGING THE FINAL GEAR OIL

1. Place the vehicle on a level surface.
2. Place a container under the final gear case to collect the used oil.
3. Remove:
   - oil filler plug ①
   - drain plug ②
4. Drain:
   - final gear oil
5. Install:
   - drain plug — **20 Nm (2.0 m · kg, 14 ft · lb)**

NOTE:

Check the drain plug gasket. If it is damaged, replace it with a new one.

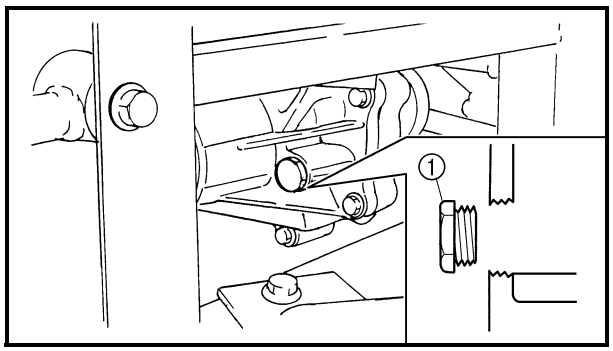
6. Fill:
   - final gear case

Periodic oil change
0.25 L (0.22 Imp qt, 0.26 US qt)
Total amount
0.28 L (0.25 Imp qt, 0.30 US qt)
Recommended oil
SAE 80 API "GL-4" Hypoid gear oil

CAUTION:

Take care not to allow foreign material to enter the final gear case.

7. Install:
   - oil filler plug — **23 Nm (2.3 m · kg, 17 ft · lb)**



CHECKING THE DIFFERENTIAL GEAR OIL

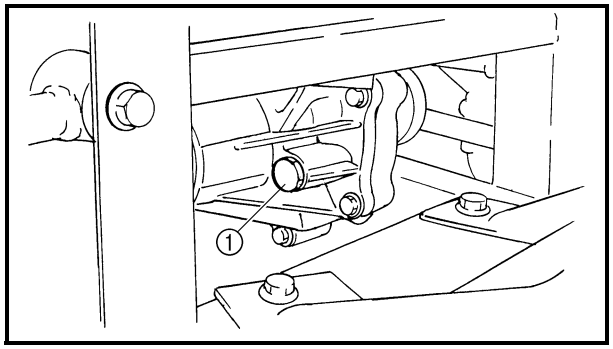
1. Place the vehicle on a level surface.
2. Remove:
   - oil filler plug ①

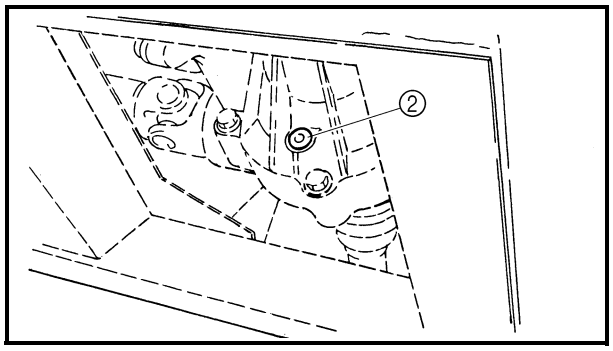
3. Check:
   • oil level
   Oil level should be up to the brim of hole.
   Oil level low → Add oil to proper level.

Recommended oil
SAE 80 API "GL-4" Hypoid gear oil

CAUTION:
Take care not allow foreign material to enter the differential gear case.

4. Install:
   • oil filler plug — **23 Nm (2.3 m · kg, 17 ft · lb)**





CHANGING THE DIFFERENTIAL GEAR OIL
1. Place the vehicle on a level surface.
2. Place a receptacle under the differential gear case.
3. Remove:
   • oil filler plug ①
   • drain plug ②
4. Drain:
   • differential gear oil
5. Install:
   • drain plug — **10 Nm (1.0 m · kg, 7.2 ft · lb)**

NOTE:
Check the gasket (drain plug). If it is damaged, replace it with new one.

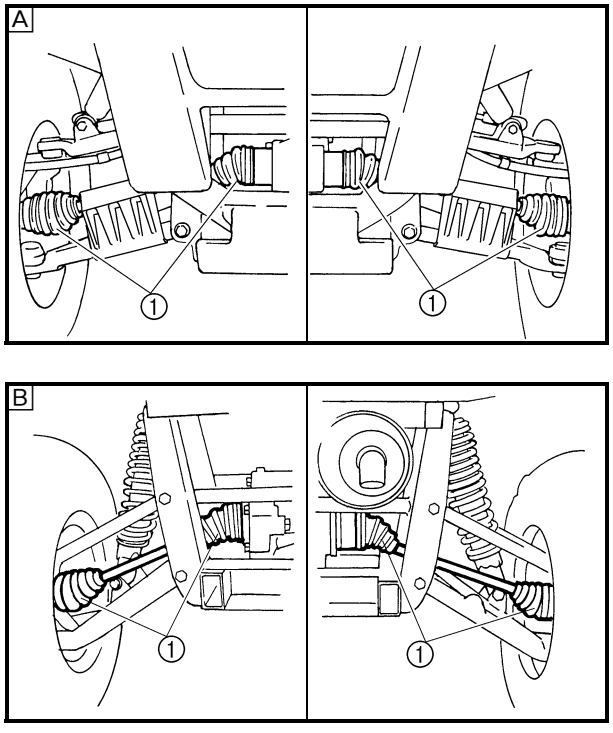
6. Fill:
   • differential gear case

Periodic oil change
0.32 L (0.28 Imp qt, 0.34 US qt)
Total amount
0.33 L (0.29 Imp qt, 0.35 US qt)
Recommended oil
SAE 80 API "GL-4" Hypoid gear oil

NOTE:
If gear oil is filled to the brim of the oil filler hole, oil may start leaking from the differential gear case breather hose. Therefore, check the quantity of the oil, not its level.

CAUTION:
Take care not to allow foreign material to enter the differential gear case.

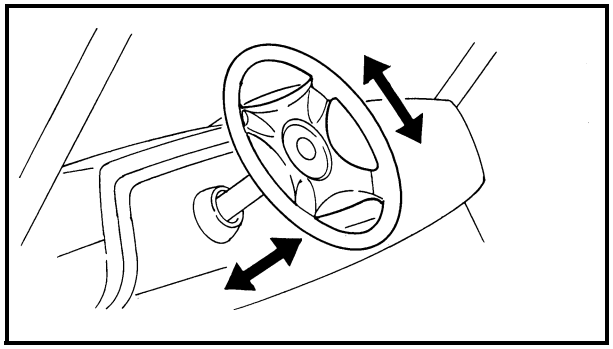
7. Install:
   • oil filler plug — **23 Nm (2.3 m · kg, 17 ft · lb)**



CHECKING THE CONSTANT VELOCITY JOINT DUST BOOTS

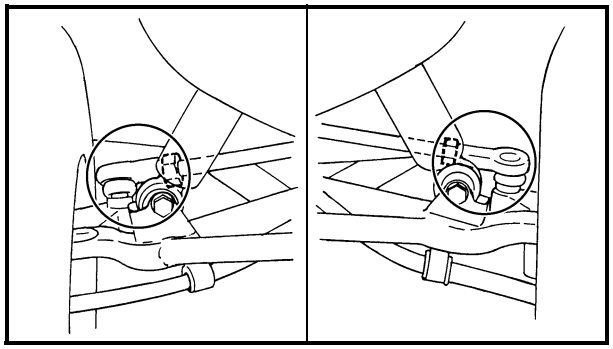
1. Check:
   • dust boots ①
   Damage → Replace.
   Refer to "FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT" in chapter 7.

A Front
B Rear

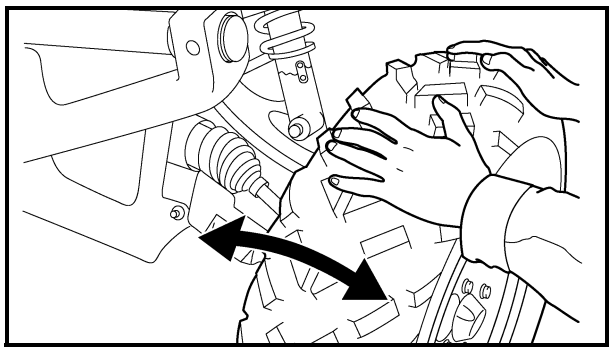


CHECKING THE STEERING SYSTEM

1. Place the vehicle on a level surface.
2. Check:
   - steering assembly bearings
     Try to the steering wheel up and down, and back and forth.
     Excessive play → Replace the steering shaft assembly.



3. Check:
   - tie-rod ends
     Turn the steering wheel to the left and right until it stops completely, and then move the steering wheel slightly in the opposite direction.
     Tie-rod end(s) have vertical play → Replace the tie-rod end(s).

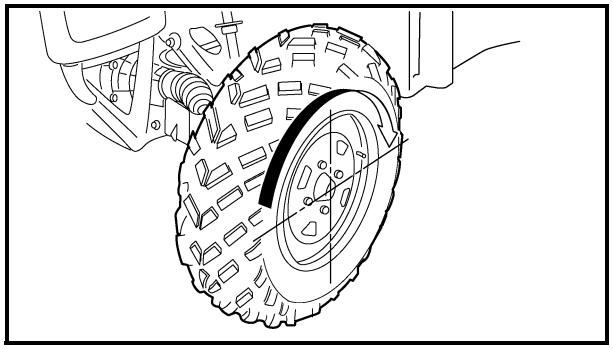


4. Raise the front end of the vehicle so that there is no weight on the front wheels.
5. Check:
   - ball joints and/or wheel bearings
     Move the wheels laterally back and forth.
     Excessive free play → Replace the front arms (upper and lower) and/or wheel bearings.

ADJUSTING THE TOE-IN

1. Place the vehicle on a level surface.
2. Measure:
   - toe-in
     Out of specification → Adjust.

Toe-in
0 ~ 10 mm (0.00 ~ 0.39 in)
(with tires touching the ground)



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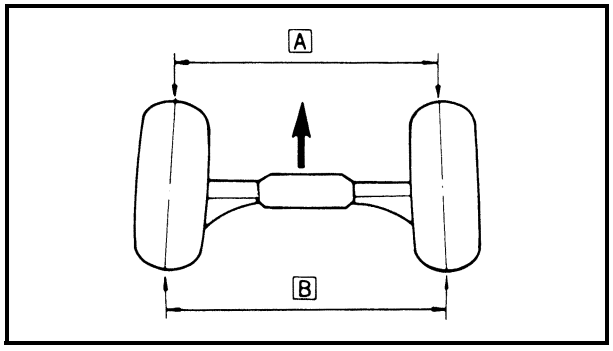
NOTE:
Before measuring the toe-in, make sure that the tire pressure is correct.

a. Mark both front tire tread centers.
b. Face the steering wheel straight ahead.



c. Measure distance A between the marks.
d. Rotate the front tires 180° until the marks are exactly opposite one another.
e. Measure distance B between the marks.
f. Calculate the toe-in using the formula given below.

Toe-in = B – A

g. If the toe-in is incorrect, adjust it.

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3. Adjust:
   • toe-in

⚠ WARNING

- **Be sure that both tie-rods are turned the same amount. If not, the vehicle will drift right or left even though the steering wheel is positioned straight. This may lead to mishandling and an accident.**
- **After setting the toe-in to specification, run the vehicle slowly for some distance with both hands lightly holding the steering wheel and check that the steering wheel responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.**

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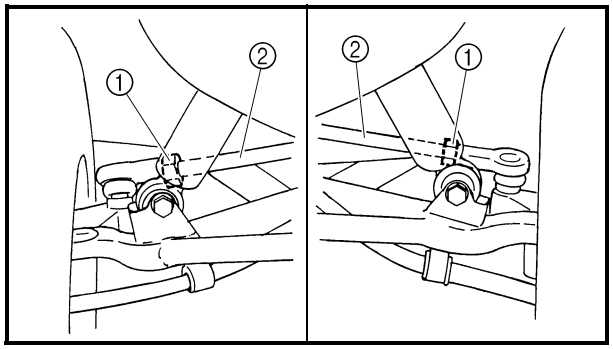

a. Mark both tie-rods ends.
   This reference point will be needed during adjustment.
b. Loosen the locknut (tie-rod end) ① on each tie-rod.
c. The same number of turns should be given to both the right and left tie-rods ② until the specified toe-in is obtained. This is to keep the length of the rods the same.
d. Tighten the rod end locknut on each tie-rod.

	Locknut (rod end) **40 Nm (4.0 m · kg, 29 ft · lb)**

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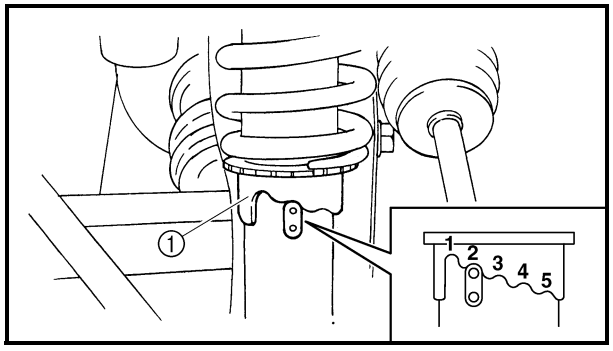
ADJUSTING THE FRONT SHOCK ABSORBERS

⚠ WARNING

Always adjust both shock absorber spring preload to the same setting. Uneven adjustment can cause poor handling and loss of stability.

NOTE:

The spring preload of the shock absorbers can be adjusted to suit the operator's preference, weight, and the operating conditions.



1. Adjust:
   - spring preload
     Turn the adjuster ① to increase or decrease the spring preload.

Standard position: 2
Minimum (Soft) position: 1
Maximum (Hard) position: 5

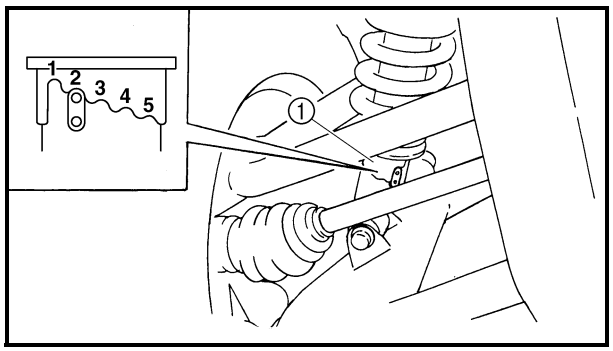
ADJUSTING THE REAR SHOCK ABSORBERS

⚠ WARNING

Always adjust both shock absorber spring preload to the same setting. Uneven adjustment can cause poor handling and loss of stability.

NOTE:

The spring preload of the shock absorbers can be adjusted to suit the operator's preference, weight, and the operating conditions.



1. Adjust:
   - spring preload
     Turn the adjuster ① to increase or decrease the spring preload.

Standard position: 2
Minimum (Soft) position: 1
Maximum (Hard) position: 5

CHECKING THE TIRES

⚠ WARNING

• TIRE CHARACTERISTICS

1) Tire characteristics influence the handling of vehicle's. The tires listed below have been approved by Yamaha Motor Manufacturing corporation of America. for this model. If other tire combinations are used, they can adversely affect your vehicle's handling characteristics and are therefore not recommended.

	Manufacturer	Size	Type
Front	GOODYEAR	25 × 8-12 NHS	Rawhide RS
Rear	GOODYEAR	25 × 10-12 NHS	Rawhide RS

• TIRE PRESSURE

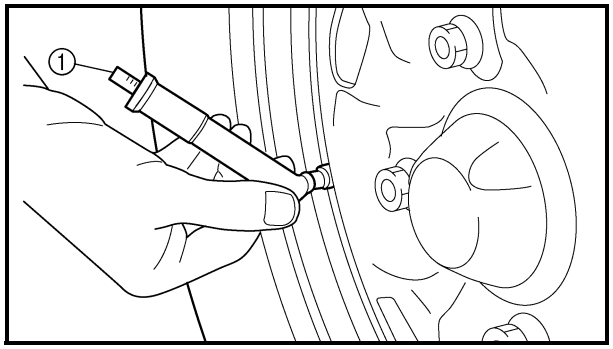
1) Recommended tire pressure
Front 70 kPa (0.70 kg/cm^2, 10 psi)
Rear 98 kPa (0.98 kg/cm^2, 14 psi)

2) Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions.
The following are minimums:
Front 63 kPa (0.63 kg/cm^2, 9 psi)
Rear 91 kPa (0.91 kg/cm^2, 13 psi)

3) Use no more than
Front 250 kPa (2.5 kg/cm^2, 36 psi)
Rear 250 kPa (2.5 kg/cm^2, 36 psi)
when seating the tire beads. Higher pressures may cause the tire to burst.
Inflate the tires slowly and carefully.
Fast inflation could cause the tire to burst.

• MAXIMUM LOADING LIMIT

1) Vehicle loading limit (total weight of cargo, operator, passenger and accessories, and tongue weight): 397 kg (876 lb)
2) Cargo bed: 181kg (400 lb)
3) Trailer hitch:
Pulling load (total weight of trailer and cargo): 550 kg (1,212 lb)
Tongue weight (vertical weight on trailer hitch point): 50 kg (110 lb)
Be extra careful of the vehicle balance and stability when towing a trailer.



1. Measure:
   • tire pressure (cold tire pressure)
   Out of specification → Adjust.

NOTE:
- The tire pressure gauge ① is included as standard equipment.
- If dust or the like is stuck to this gauge, it will not provide the correct readings. Therefore, take two measurements of the tire's pressure and use the second reading.

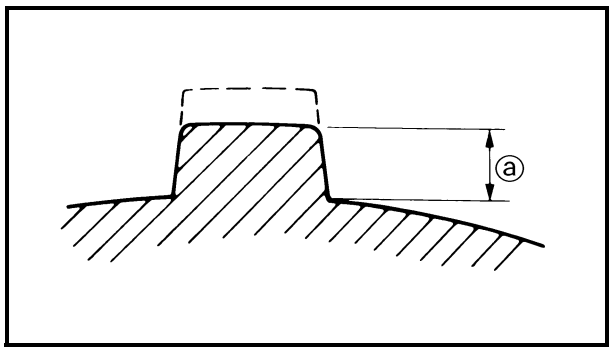
Cold tire pressure	Front	Rear
Standard	70 kPa (0.70 kg/cm², 10 psi)	98 kPa (0.98 kg/cm², 14 psi)
Minimum	63 kPa (0.63 kg/cm², 9 psi)	91 kPa (0.91 kg/cm², 13 psi)
Maximum	77 kPa (0.77 kg/cm², 11 psi)	105 kPa (1.05 kg/cm², 15 psi)

⚠ WARNING

Uneven or improper tire pressure may adversely affect the handling of this vehicle and may cause loss of control.
- **Maintain proper tire pressures.**
- **Set tire pressures when the tires are cold.**
- **Tire pressures must be equal in both front tires and equal in both rear tires.**

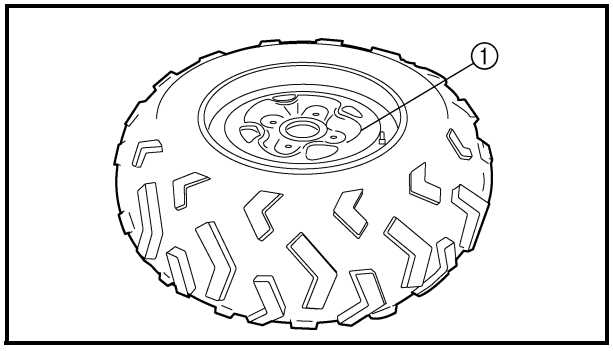
2. Check:
   • tire surfaces
   Wear/damage → Replace.

Tire wear limit ⓐ
Front and rear: 3.0 mm (0.12 in)



⚠ WARNING

It is dangerous to ride with a worn-out tire. When tire wear is out of specification, replace the tire immediately.



CHECKING THE WHEELS

1. Check:
   - wheels ①
     Damage/bends → Replace.

NOTE:
Always balance the wheel when a tire or wheel has been changed or replaced.

⚠ WARNING

- **Never attempt even small repairs to the wheel.**
- **Ride conservatively after installing a tire to allow it to seat itself properly on the rim.**

CHECKING AND LUBRICATING THE CABLES

⚠ WARNING

A damaged cable sheath may cause corrosion and interfere with the cable movement. An unsafe condition may result so replace a damaged cable as soon as possible.

1. Check:
   - cable sheath
     Damage → Replace.
2. Check:
   - cable operation
     Unsmooth operation → Lubricate or replace.

Recommended lubricant
Yamaha chain and cable lube or engine oil

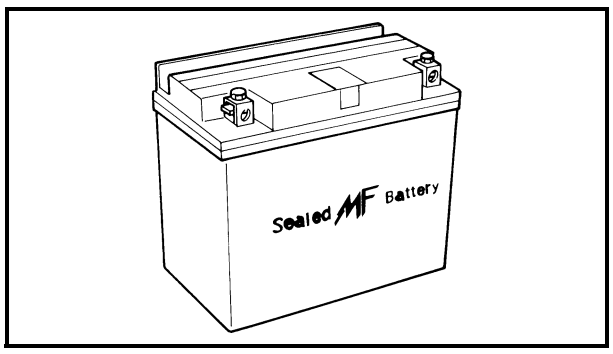
NOTE:
Hold the cable end up and apply several drops of lubricant to the cable.

3. Apply:
   - lithium-soap-based grease
     (onto end of the cable)

LUBRICATING THE PEDAL, ETC.

1. Lubricate the pivoting parts.

	Recommended lubricant **Lithium-soap-based grease**



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ELECTRICAL

CHECKING AND CHARGING THE BATTERY

⚠ WARNING

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:

- **Wear protective eye gear when handling or working near batteries.**
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).**
- **DO NOT SMOKE when charging or handling batteries.**
- **KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.**
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**

FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL

- **Skin — Wash with water.**
- **Eyes — Flush with water for 15 minutes and get immediate medical attention.**

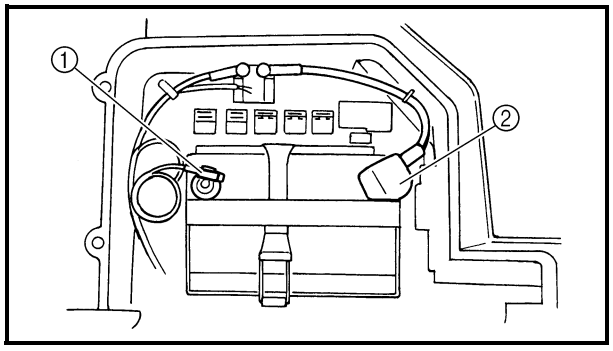
INTERNAL

- **Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.**

CAUTION:

- **This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.**
- **Charging time, charging amperage and charging voltage for an MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**

NOTE:
Since MF batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.



1. Lift the hood up.
2. Remove:
   • battery case cover
3. Disconnect:
   • battery leads

CAUTION:
First, disconnect the negative battery lead ①, and then the positive battery lead ②.

4. Remove:
   • battery
5. Check:
   • battery charge

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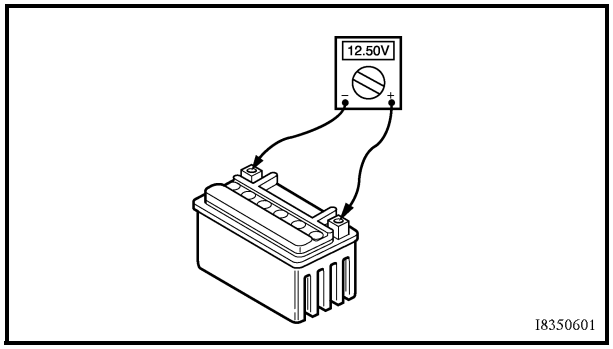
a. Connect a pocket tester to the battery terminals.

Positive tester probe → positive battery terminal
Negative tester probe → negative battery terminal



NOTE:
- The charge state of an MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

b. Check the charge of the battery, as shown in the charts and the following example.

Example

c. Open-circuit voltage = 12.0 V
d. Charging time = 6.5 hours
e. Charge of the battery = 20 ~ 30%

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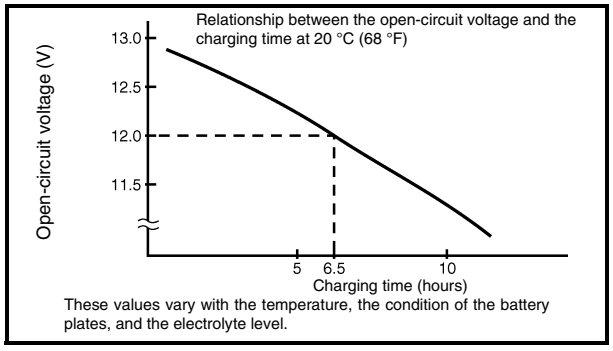
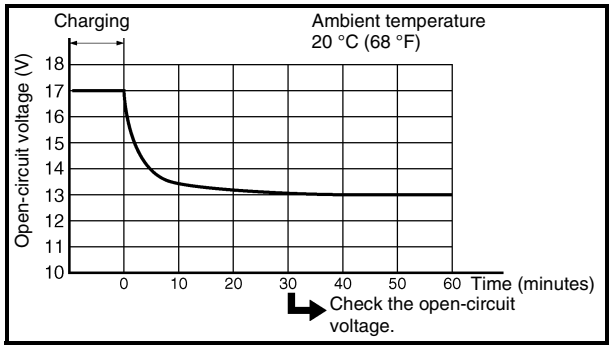
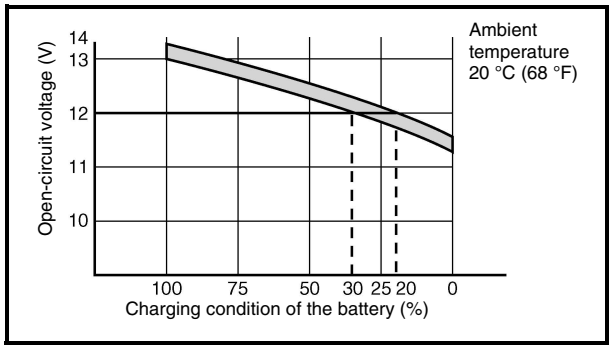






6. Charge:
   - battery

   (refer to the appropriate charging method illustration)

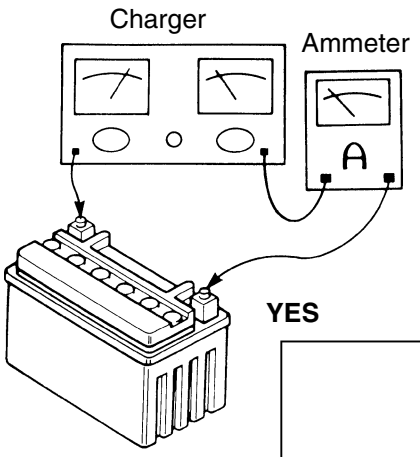
⚠ WARNING

Do not quick charge a battery.

CAUTION:

- **Never remove the MF battery sealing caps.**
- **Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.**
- **If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.**
- **When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)**
- **To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.**
- **Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.**
- **Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.**
- **If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!**
- **As shown in the following illustration, the open-circuit voltage of an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.**

Charging method using a variable-current (voltage) charger



Measure the open-circuit voltage prior to charging.

NOTE:
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

Connect a charger and ammeter to the battery and start charging.

NOTE:
Set the charging voltage to 16 ~ 17 V. (If the charging voltage is lower, charging will be insufficient, if it is higher, the battery will be over-charged.)

Is the amperage higher than the standard charging amperage written on the battery?

YES

NO

Adjust the charging voltage to 20 ~ 25 V.

Monitor the amperage for 3 ~ 5 minutes. Is the standard charging amperage exceeded?

YES

NO

Adjust the voltage to obtain the standard charging amperage.

If the amperage does not exceed the standard charging amperage after 5 minutes, replace the battery.

Set the timer to the charging time determined by the open-circuit voltage.
Refer to "CHECKING AND CHARGING THE BATTERY".

If the required charging time exceeds 5 hours, it is advisable to check the charging amperage after 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging amperage.

Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.
12.8 V → Charging is complete.
12.0 ~ 12.7 V → Recharging is required.
Under 12.0 V → Replace the battery.

Charging method using a constant voltage charger

NOTE:
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

Measure the open-circuit voltage prior to charging.

↓

Connect a charger and ammeter to the battery and start charging.

↓

Is the amperage higher than the standard charging amperage written on the battery?

YES → Charge the battery until the charging voltage reaches 15 V.

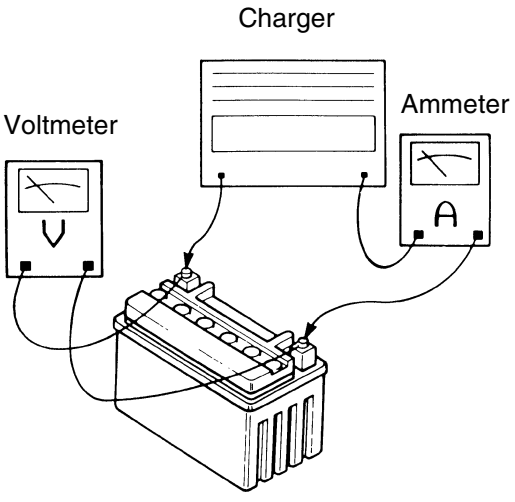
NOTE:
Set the charging time to a maximum of 20 hours.

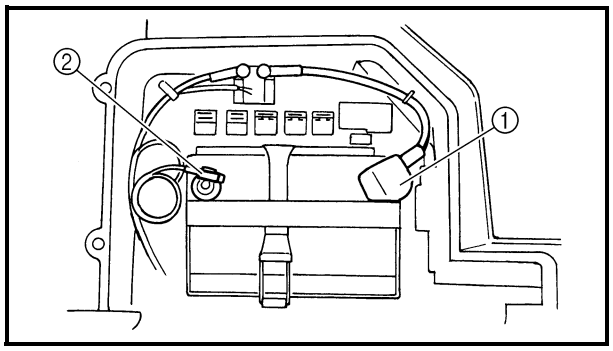
↓

Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.
12.8 V → Charging is complete.
12.0 ~ 12.7 V → Recharging is required.
Under 12.0 V → Replace the battery.

CAUTION:
Constant amperage chargers are not suitable for charging MF batteries.

NO → This type of battery charger cannot charge an MF battery. A variable voltage charger is recommended.





7. Install:
   • battery
8. Connect:
   • battery leads

CAUTION:

First, connect the positive battery lead ①, and then the negative battery lead ②.

9. Check:
   • battery terminals
   Dirt → Clean with a wire brush.
   Loose connection → Connect properly.
10. Lubricate:
   • battery terminals

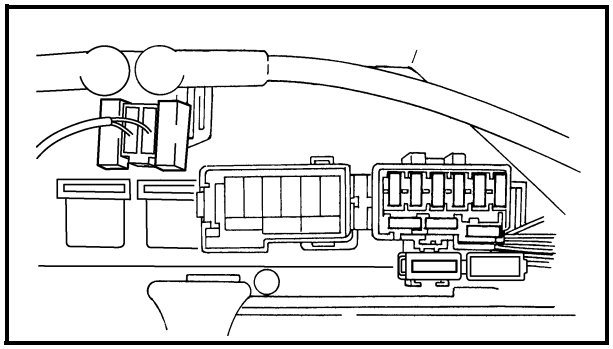
	Recommended lubricant **Dielectric grease**

11. Install:
   • battery case cover
12. Close the hood.

CHECKING THE FUSES

CAUTION:

Always turn off the main switch when checking or replacing a fuse. Otherwise, a short circuit may occur.



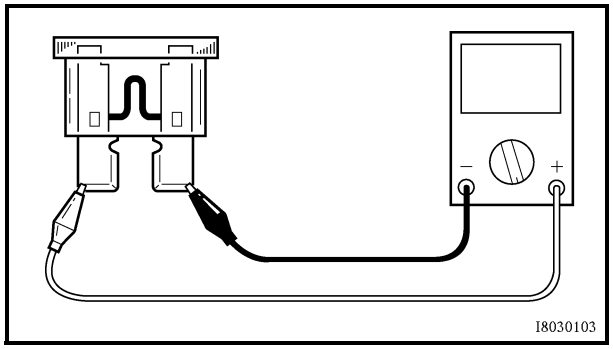
1. Lift the hood up.
2. Remove:
   • battery case cover
3. Check:
   • fuses

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Connect the pocket tester to the fuse and check it for continuity.

NOTE:

Set the tester to the "Ω × 1" position.



	Pocket tester **P/N. YU-03112-C, 90890-03112**

b. If the tester indicates "∞", replace the fuse.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

4. Replace:
   • blown fuse

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Turn off the ignition.
b. Install a new fuse of the proper amperage.
c. Turn on switches to verify operation of the related electrical devices.
d. If the fuse immediately blows again, check the electrical circuit.

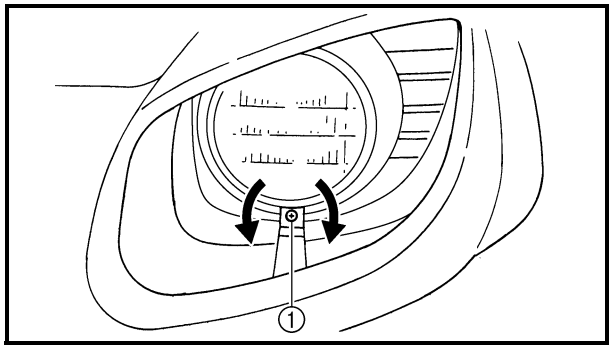
▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

Description	Current rating	Quantity
Main	30 A	1
Lighting system fuse	15 A	1
Ignition	10 A	1
Terminal (Auxiliary DC jack)	10 A	1
4WD (Four-wheel drive)	3 A	1
Signaling system fuse	10 A	1
Carburetor heater fuse	10 A	1
Backup fuse	10 A	1
Reserve	30 A	1
Reserve	15 A	1
Reserve	10 A	1
Reserve	3 A	1

⚠ WARNING

Never use a fuse with a rating other than that specified. Never use other materials in place of a fuse. An improper fuse may cause extensive damage to the electrical system, a malfunction of the lighting and ignition systems and could possibly cause a fire.

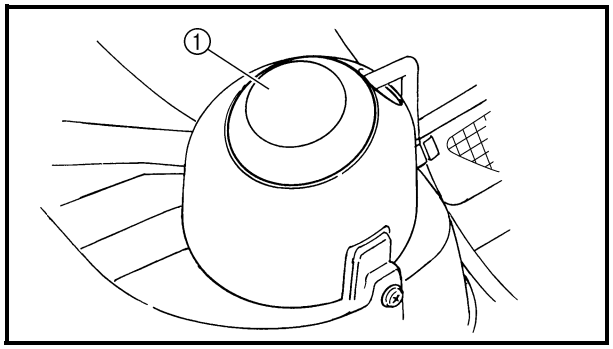
5. Install:
   • battery case cover
6. Close the hood.



ADJUSTING THE HEADLIGHT BEAM

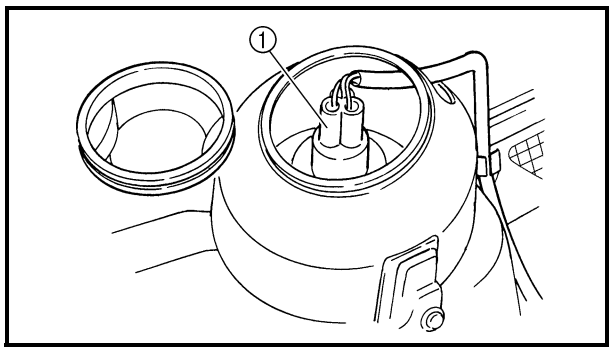
1. Adjust:
   - headlight beam (vertically)
     Turn the adjuster ① in or out.

Turning in	**Headlight beam raised.**
Turning out	**Headlight beam lowered.**



CHANGING THE HEADLIGHT BULB

1. Lift the hood up.
2. Remove:
   - headlight bulb holder cover ①

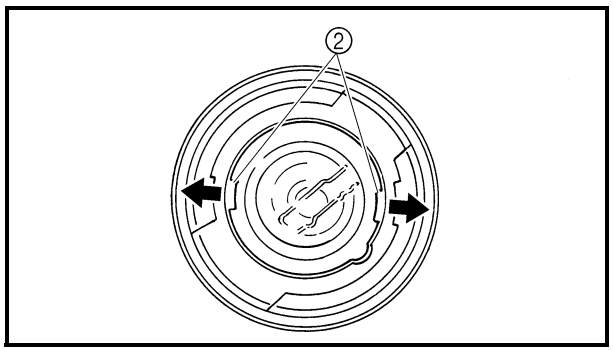


3. Remove:
   - headlight bulb holder (with bulb) ①
   - bulb

NOTE:
Remove the defective bulb by unhooking the headlight bulb holder tabs ②.

⚠ WARNING

Keep flammable products and your hands away from the bulb while it is on, since it will be hot. Do not touch the bulb until it cools down.

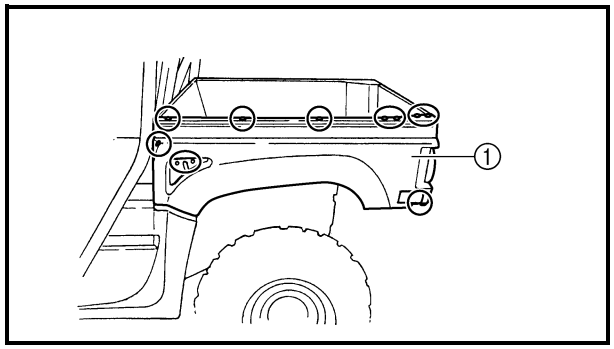


4. Install:
   - bulb New
     Secure the new bulb with the headlight bulb holder.

CAUTION:

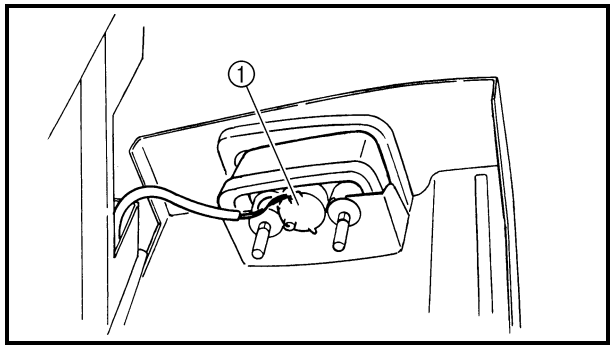
Avoid touching the glass part of the bulb. Keep it free from oil; otherwise, the transparency of the glass, life of the bulb, and luminous flux will be adversely affected. If oil gets on the bulb, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

5. Install:
   - headlight bulb holder (with bulb)
   - headlight bulb holder cover
6. Close the hood.



CHANGING THE TAIL/BRAKE LIGHT BULB

1. Remove:
   - cargo bed panel ①



2. Remove:
   - tail/brake light bulb holder (with bulb) ①
   - bulb

NOTE:

Turn the bulb holder counterclockwise and remove the defective bulb.

⚠ WARNING

Keep flammable products and your hands away from the bulb while it is on, since it will be hot. Do not touch the bulb until it cools down.

3. Install:
   - bulb New
     Secure the new bulb with the tail/brake light bulb holder.

CAUTION:

Avoid touching the glass part of the bulb. Keep it free from oil; otherwise, the transparency of the glass, life of the bulb, and luminous flux will be adversely affected. If oil gets on the bulb, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

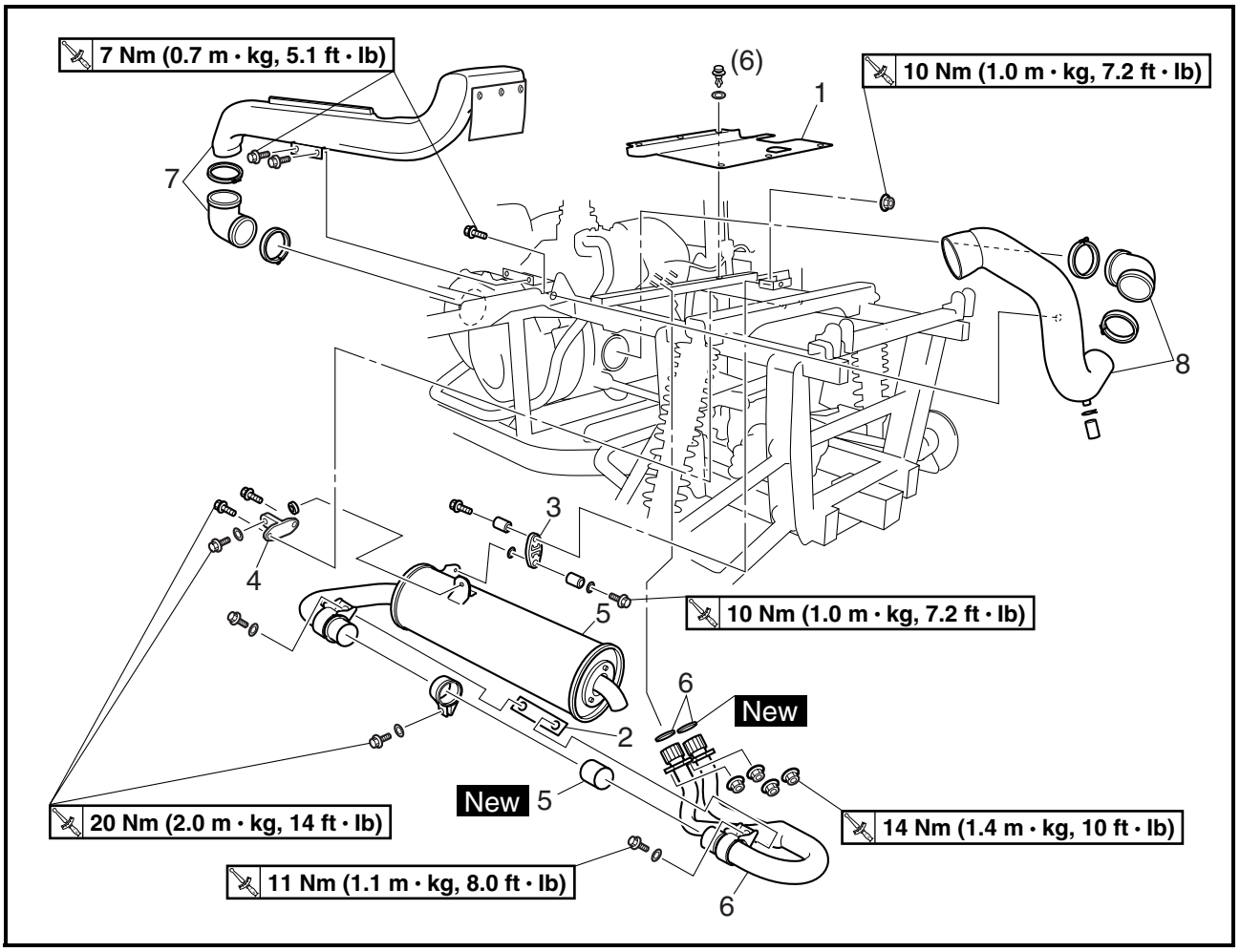
4. Install:
   - tail/brake light bulb holder (with bulb)
5. Install:
   - cargo bed panel

	7 Nm (0.7 m · kg, 5.1 ft · lb)

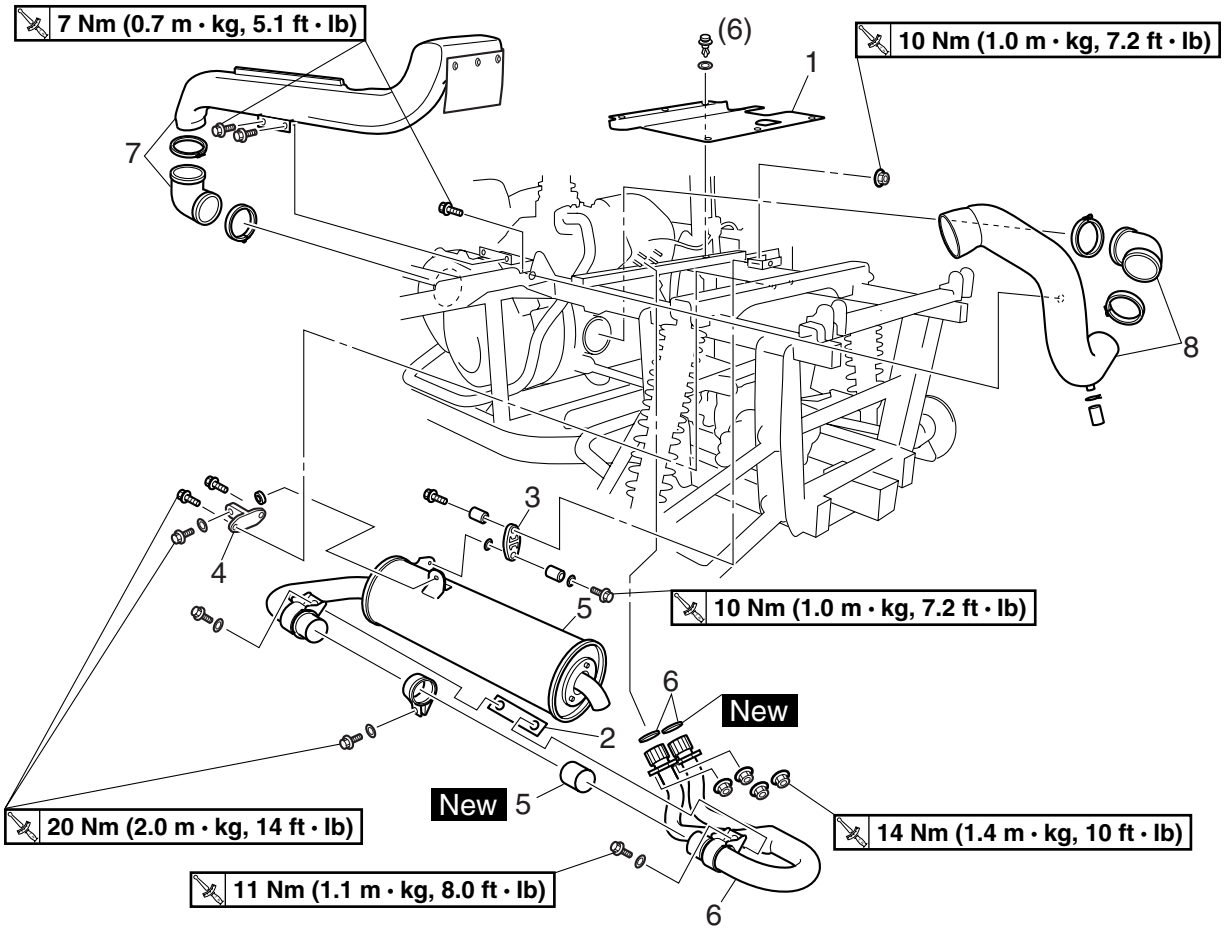
ENGINE

ENGINE REMOVAL

AIR DUCTS, MUFFLER AND EXHAUST PIPE

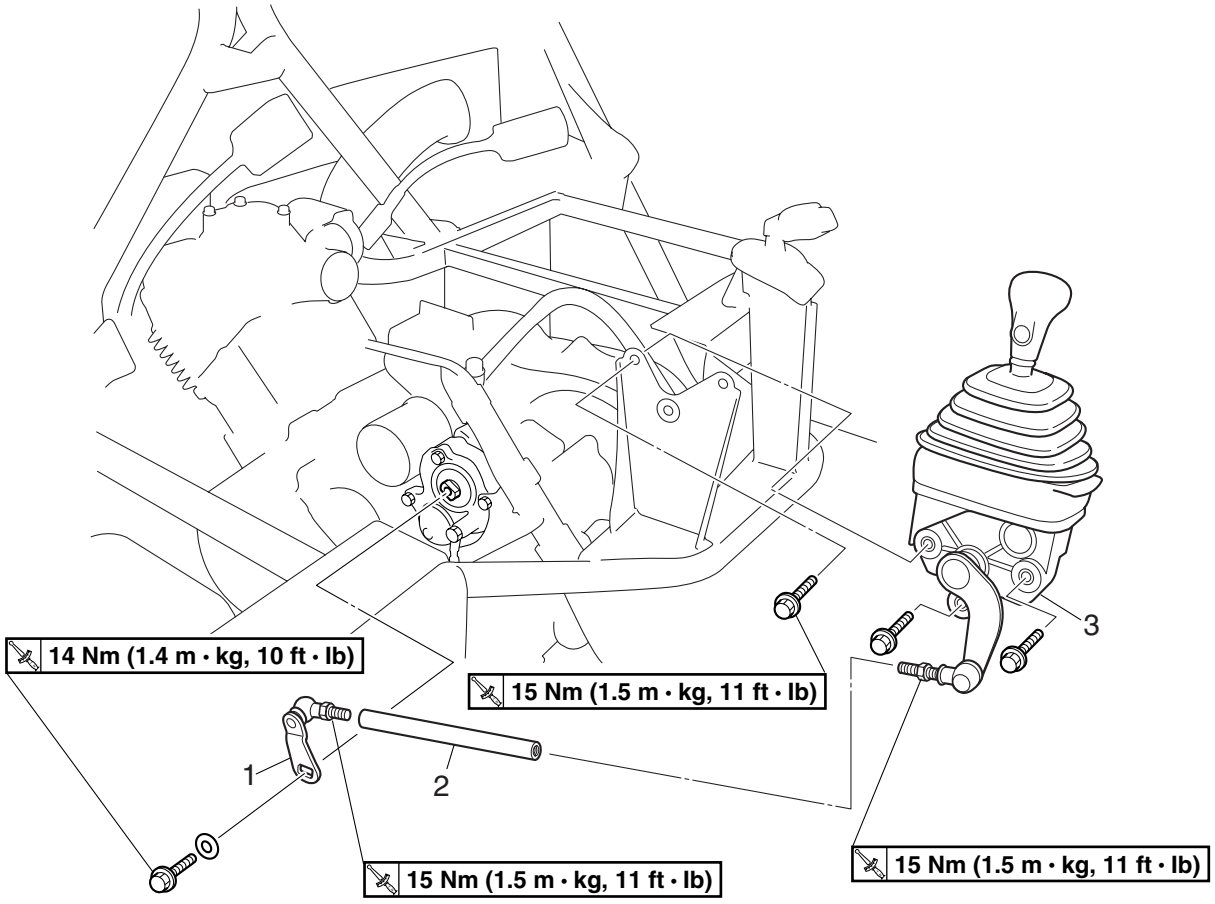


Order	Job/Part	Q'ty	Remarks
	Removing the air ducts, muffler and exhaust pipe		Remove the parts in the order listed.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Driver seat/passenger seat/console/air duct end cover/left protector		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
	Engine cooling fan air duct assembly		Refer to "ENGINE COOLING FAN AND A.C. MAGNETO".
	Carburetor assembly/air filter case		Refer to "CARBURETOR" in chapter 6.



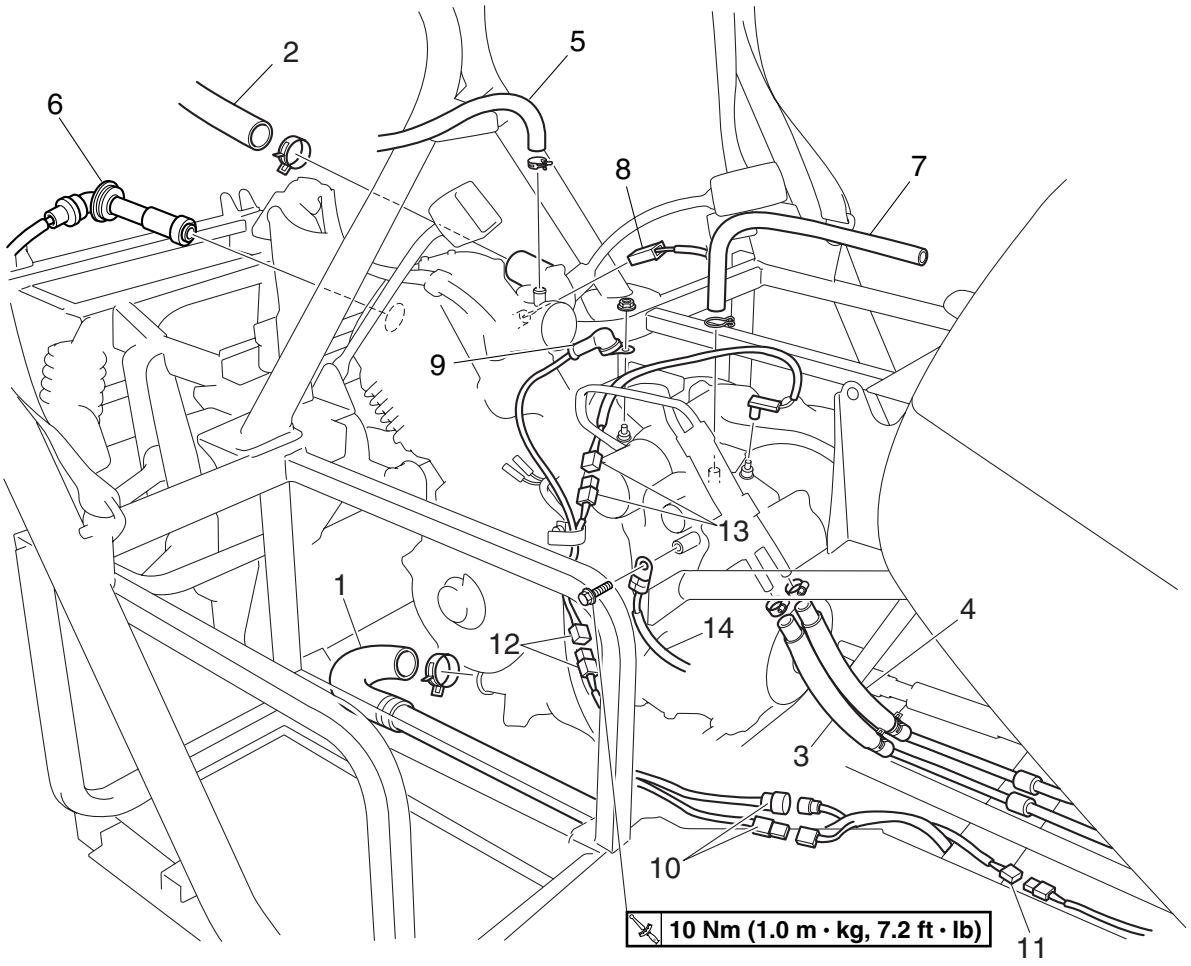
Order	Job/Part	Q'ty	Remarks
	Fuel tank		Refer to "FUEL PUMP AND FUEL TANK" in chapter 6.
1	Heat protector	1	
2	Muffler stay	1	
3	Muffler damper	1	
4	Muffler bracket	1	
5	Muffler/gasket	1/1	
6	Exhaust pipe/gasket	1/2	
7	Air duct assembly 1	1	
8	Air duct assembly 2	1	
			For installation, reverse the removal procedure.

SELECT LEVER UNIT AND COOLANT RESERVOIR

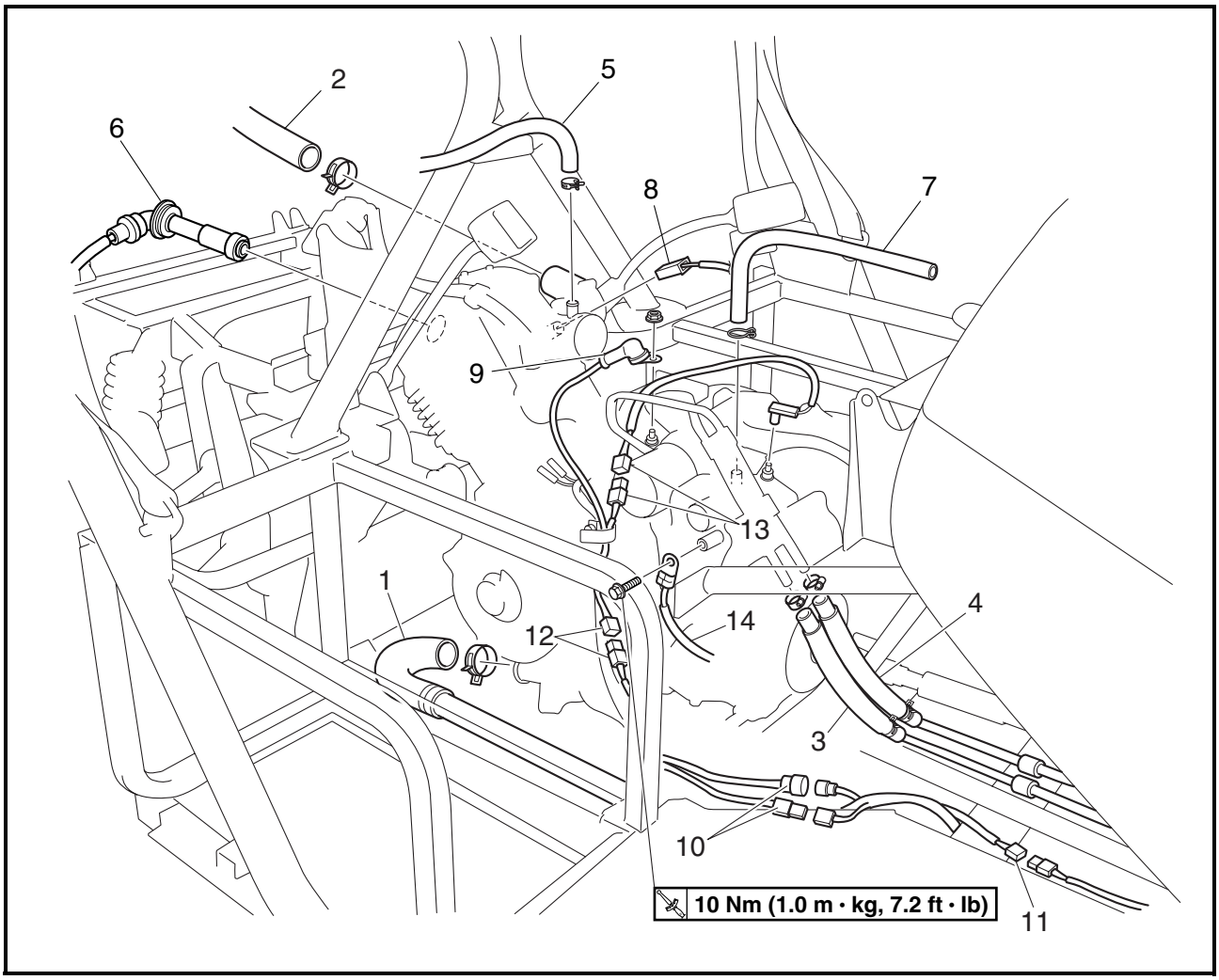


Order	Job/Part	Q'ty	Remarks
	Removing the select lever unit and coolant reservoir		Remove the parts in the order listed.
1	Shift arm	1	
2	Select lever shift rod	1	**CAUTION:** **The select lever shift rod locknut (select lever side) has left-handed threads. To loosen the locknut, turn it clockwise.**
3	Select lever unit	1	For installation, reverse the removal procedure.

HOSES AND LEADS

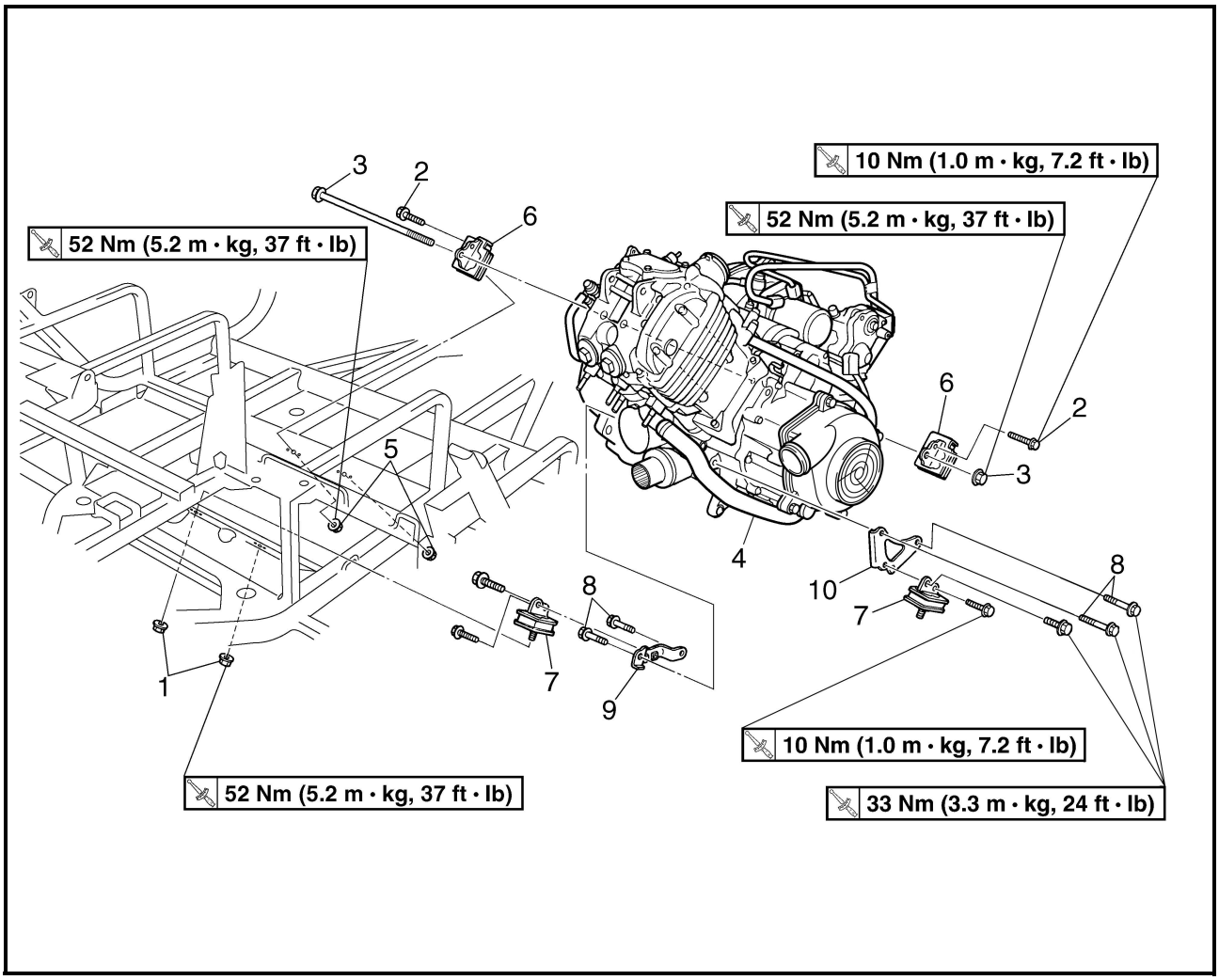


Order	Job/Part	Q'ty	Remarks
	Removing the hoses and leads		Remove the parts in the order listed.
1	Water pump inlet hose	1	Disconnect.
2	Coolant outlet hose	1	Disconnect.
3	Oil inlet hose	1	Disconnect.
4	Oil outlet hose	1	Disconnect.
5	Vacuum hose	1	Disconnect.
6	Spark plug lead	1	
7	Crankcase breather hose	1	
8	Thermo switch 1 lead	1	Disconnect.
9	Starter motor lead	1	Disconnect.
10	A.C. magneto lead coupler	2	Disconnect.
11	Speed sensor lead coupler	1	Disconnect.
12	Gear position switch lead coupler	1	Disconnect.

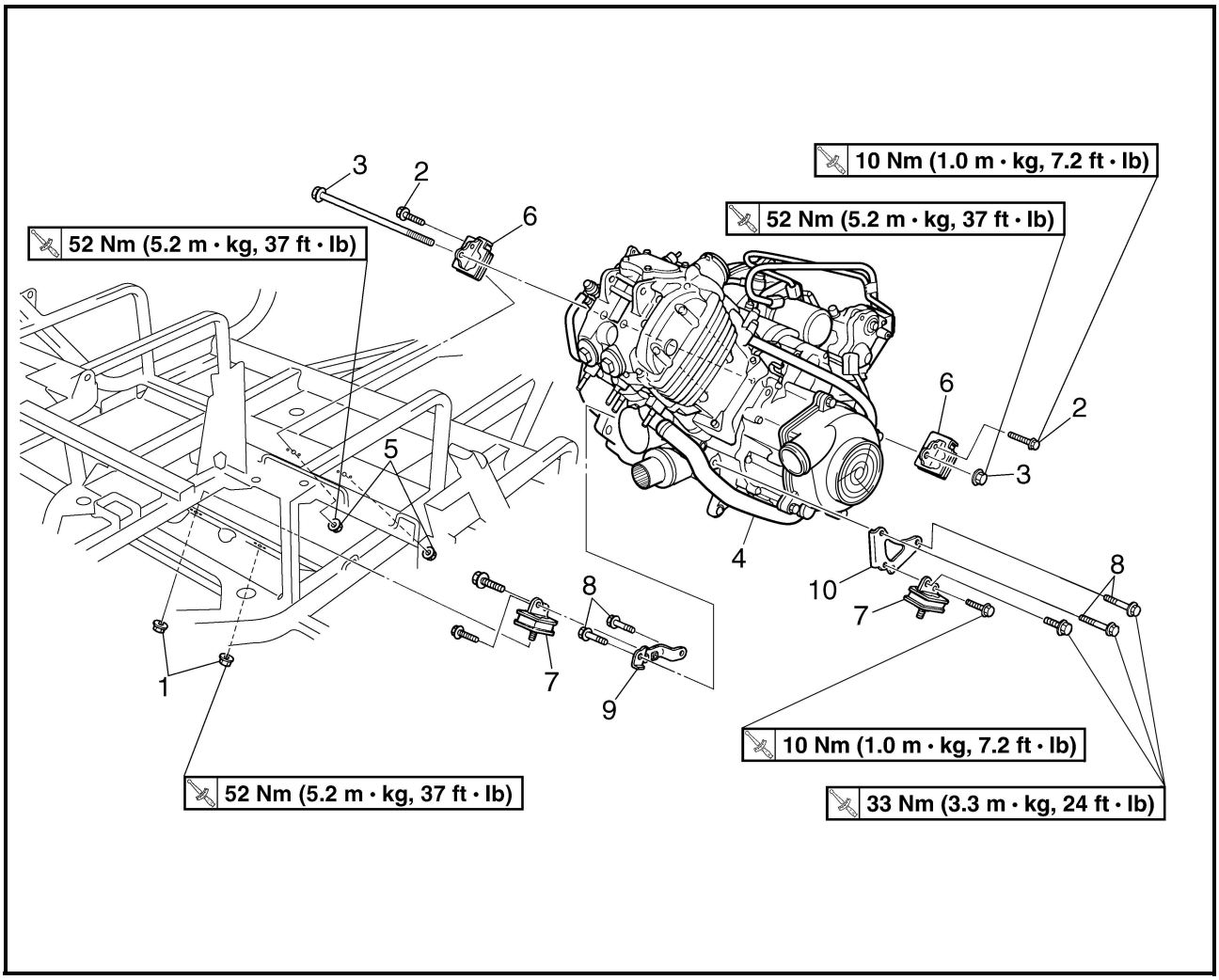


Order	Job/Part	Q'ty	Remarks
13	Reverse switch lead	1	Green/White
14	Engine ground lead	1	Disconnect. For installation, reverse the removal procedure.

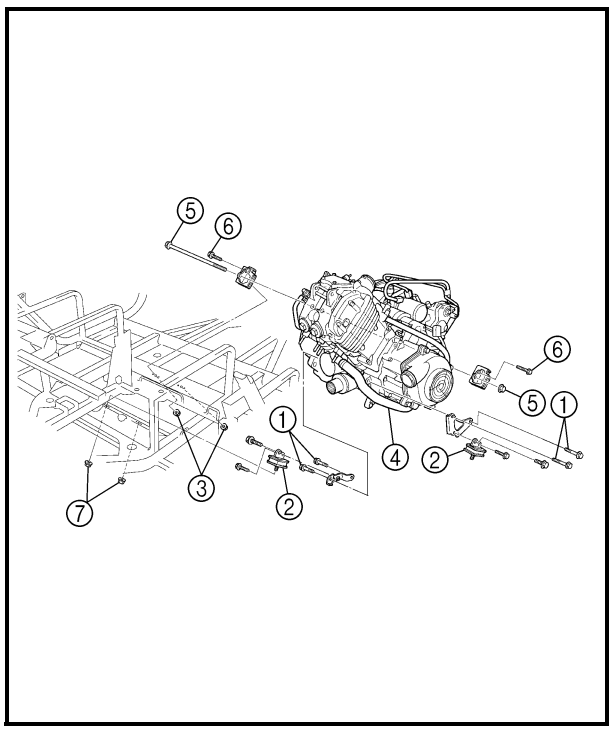
ENGINE MOUNTING BOLTS



Order	Job/Part	Q'ty	Remarks
	Removing the engine mounting bolts		Remove the parts in the order listed.
	Front skid plate/center skid plate/rear skid plate		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
	Rear wheels		Refer to "REAR WHEELS AND BRAKE DISC" in chapter 8.
	Final drive gear assembly		Refer to "REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE SHAFT" in chapter 7.


10 Nm (1.0 m · kg, 7.2 ft · lb)
52 Nm (5.2 m · kg, 37 ft · lb)
52 Nm (5.2 m · kg, 37 ft · lb)
52 Nm (5.2 m · kg, 37 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
33 Nm (3.3 m · kg, 24 ft · lb)
1
2
3
4
5
6
7
8
9
10

Order	Job/Part	Q'ty	Remarks
1	Rubber damper nut (rear)	2	**NOTE:**
2	Engine mounting bolt (front-upper)	2	Remove the engine assembly from the top of the vehicle.
3	Engine mounting bolt (front-lower)/nut	1/1	
4	Engine assembly	1	
5	Rubber damper nut (front)	2	**CAUTION:**
6	Rubber damper (front)	2	**Install all of the bolts/nuts and then tighten them to full torque specifications.**
7	Rubber damper (rear)	2	
8	Engine mounting bolt (rear)	4	
9	Engine bracket (left)	1	
10	Engine bracket (right)	1	Refer to "INSTALLING THE ENGINE".
			For installation, reverse the removal procedure.



INSTALLING THE ENGINE

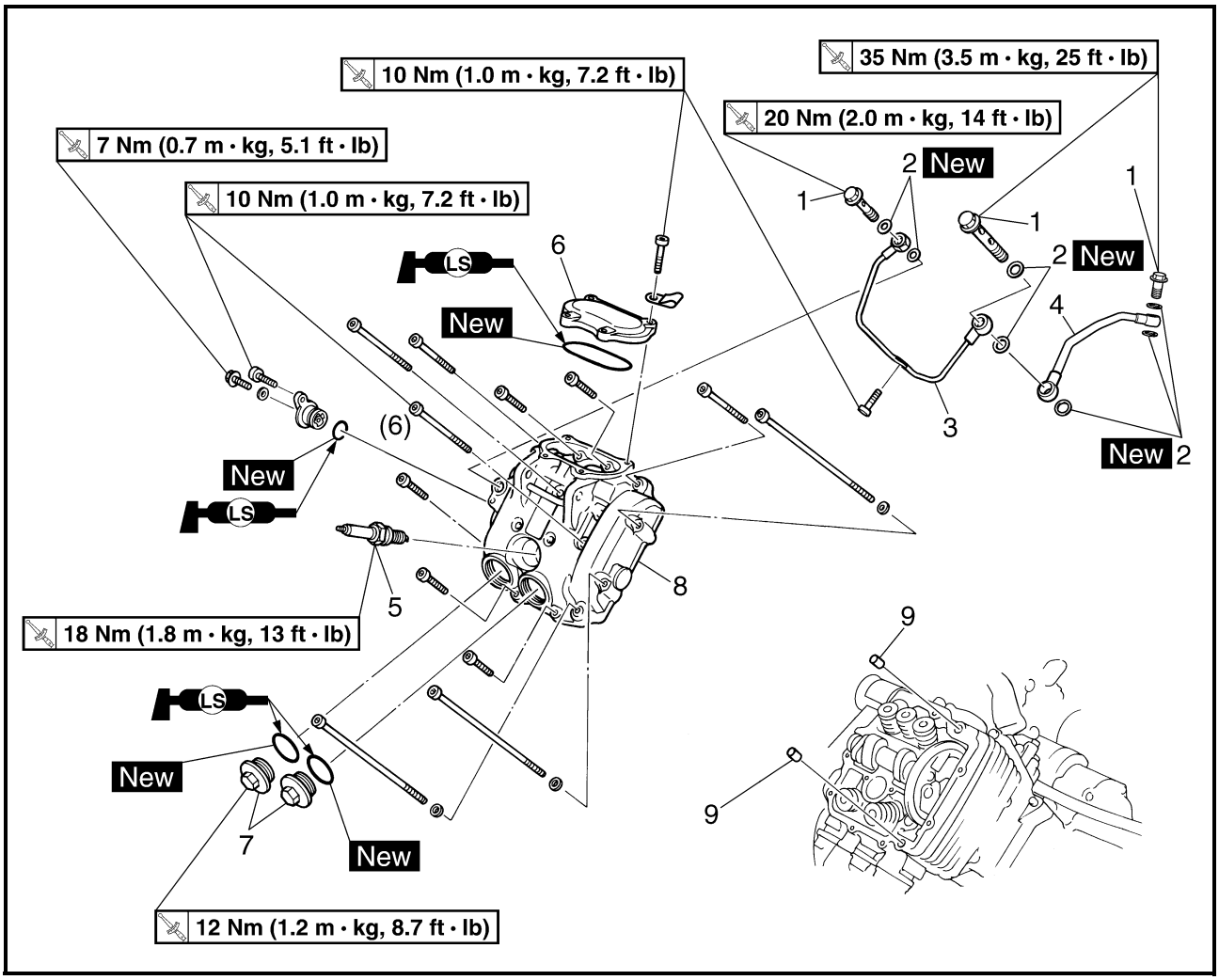
1. Install:
   - engine mounting bolt (rear) ①
   - rubber damper (rear) ②
   - rubber damper nut (front) ③
   - engine assembly ④
   - engine mounting bolt (front lower)/nut ⑤
   - engine mounting bolt (front upper) ⑥
   - rubber damper nut (rear) ⑦

NOTE:

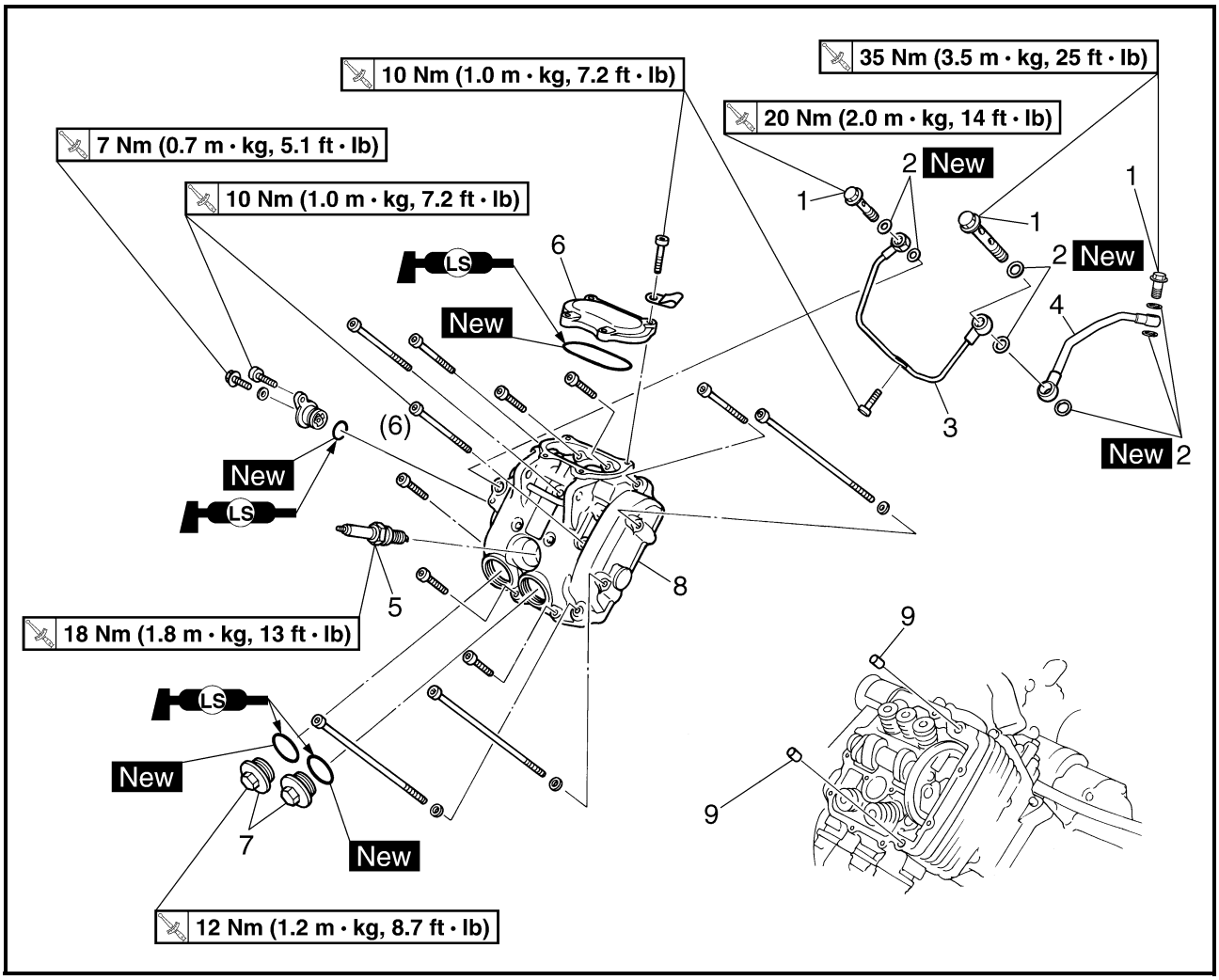
Do not fully tighten the bolts and nuts.

2. Tighten:
   - engine mounting bolt (rear) ①
     33 Nm (3.3 m · kg, 24 ft · lb)
   - rubber damper nut (front) ③
     52 Nm (5.2 m · kg, 37 ft · lb)
   - engine mounting bolt (M10, front lower)/nut ⑤
     56 Nm (5.6 m · kg, 40 ft · lb)
   - engine mounting bolt (M6, front upper) ⑥
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - rubber damper nut (rear) ⑦
     52 Nm (5.2 m · kg, 37 ft · lb)

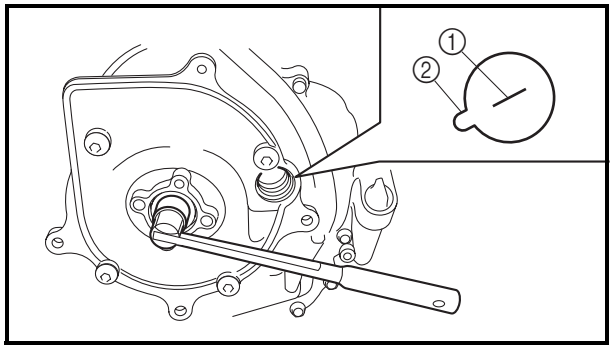
CYLINDER HEAD COVER


10 Nm (1.0 m · kg, 7.2 ft · lb)
35 Nm (3.5 m · kg, 25 ft · lb)
20 Nm (2.0 m · kg, 14 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
LS
New
(6)
18 Nm (1.8 m · kg, 13 ft · lb)
12 Nm (1.2 m · kg, 8.7 ft · lb)

Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head cover		Remove the parts in the order listed.
	Driver seat/passenger seat/console		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
	air shroud 1/engine cooling fan/timing plug		Refer to "ADJUSTING THE VALVE CLEARANCE" in chapter 3.
1	Union bolt	3	
2	Copper washer	7	
3	Oil delivery pipe 3	1	
4	Oil delivery pipe 2	1	
5	Spark plug	1	
6	Tappet cover (intake)	1	
7	Tappet cover (exhaust)	2	


10 Nm (1.0 m · kg, 7.2 ft · lb)
35 Nm (3.5 m · kg, 25 ft · lb)
20 Nm (2.0 m · kg, 14 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
LS
New
(6)
18 Nm (1.8 m · kg, 13 ft · lb)
12 Nm (1.2 m · kg, 8.7 ft · lb)

Order	Job/Part	Q'ty	Remarks
8	Cylinder head cover	1	Refer to "REMOVING THE CYLINDER HEAD COVER" and "INSTALLING THE CYLINDER HEAD COVER".
9	Dowel pin	2	For installation, reverse the removal procedure.



REMOVING THE CYLINDER HEAD COVER

1. Align:
   - "I" mark (with stationary pointer)

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a. Turn the crankshaft counterclockwise with a wrench.
b. Align the "I" mark ① on the rotor with the stationary pointer ② on the A.C. magneto cover. When the "I" mark is aligned with the stationary pointer, the piston is at the Top Dead Center (TDC).

NOTE:

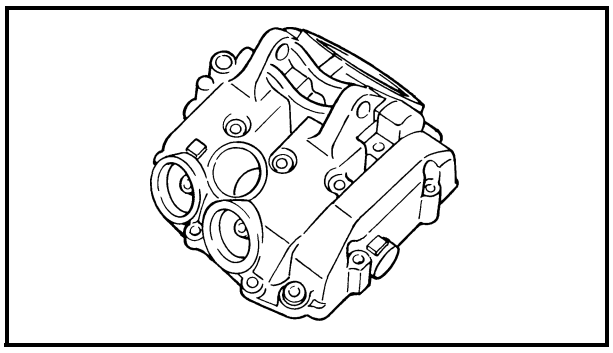
- When the piston is at the top dead center (TDC) on the compression stroke, there should be clearance between the valve stem tips and their respective rocker arm adjusting screws.
- If there is no clearance, rotate the crankshaft counterclockwise one turn.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

2. Remove:
   - cylinder head cover

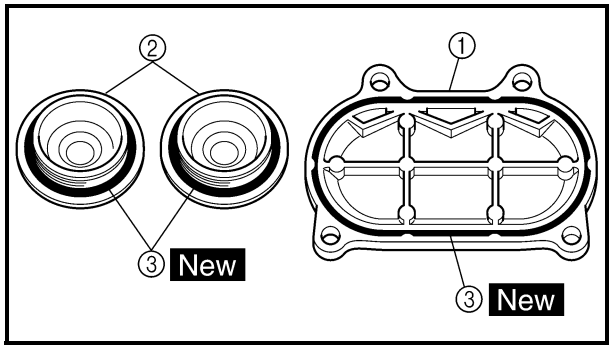
NOTE:

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all the bolts are loosened, remove them.



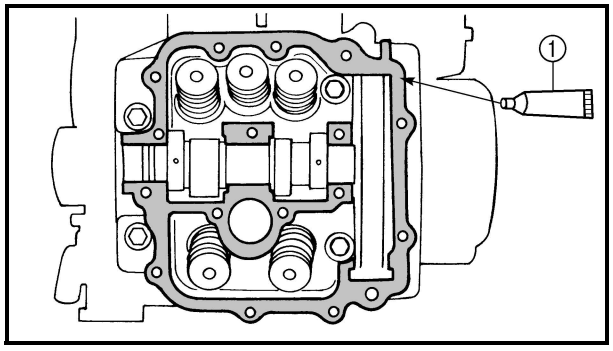
CHECKING THE CYLINDER HEAD COVER

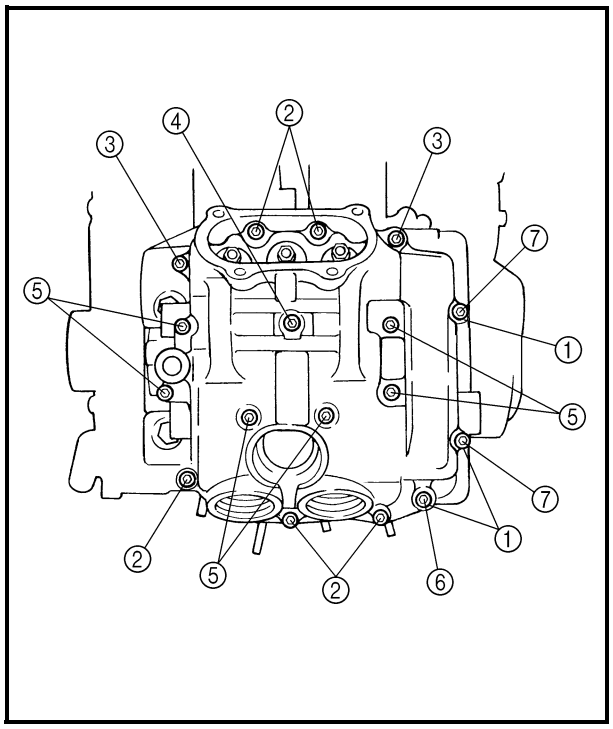
1. Check:
   - cylinder head cover
     Cracks/damage → Replace the cylinder head cover and cylinder head as a set.



CHECKING THE TAPPET COVERS

1. Check:
   - tappet cover (intake) ①
   - tappet cover (exhaust) ②
     Cracks/damage → Replace.
   - O-rings ③ New





INSTALLING THE CYLINDER HEAD COVER

1. Apply:
   - sealant (Quick Gasket®) ①
     (to the mating surfaces of the cylinder head and cylinder head cover)

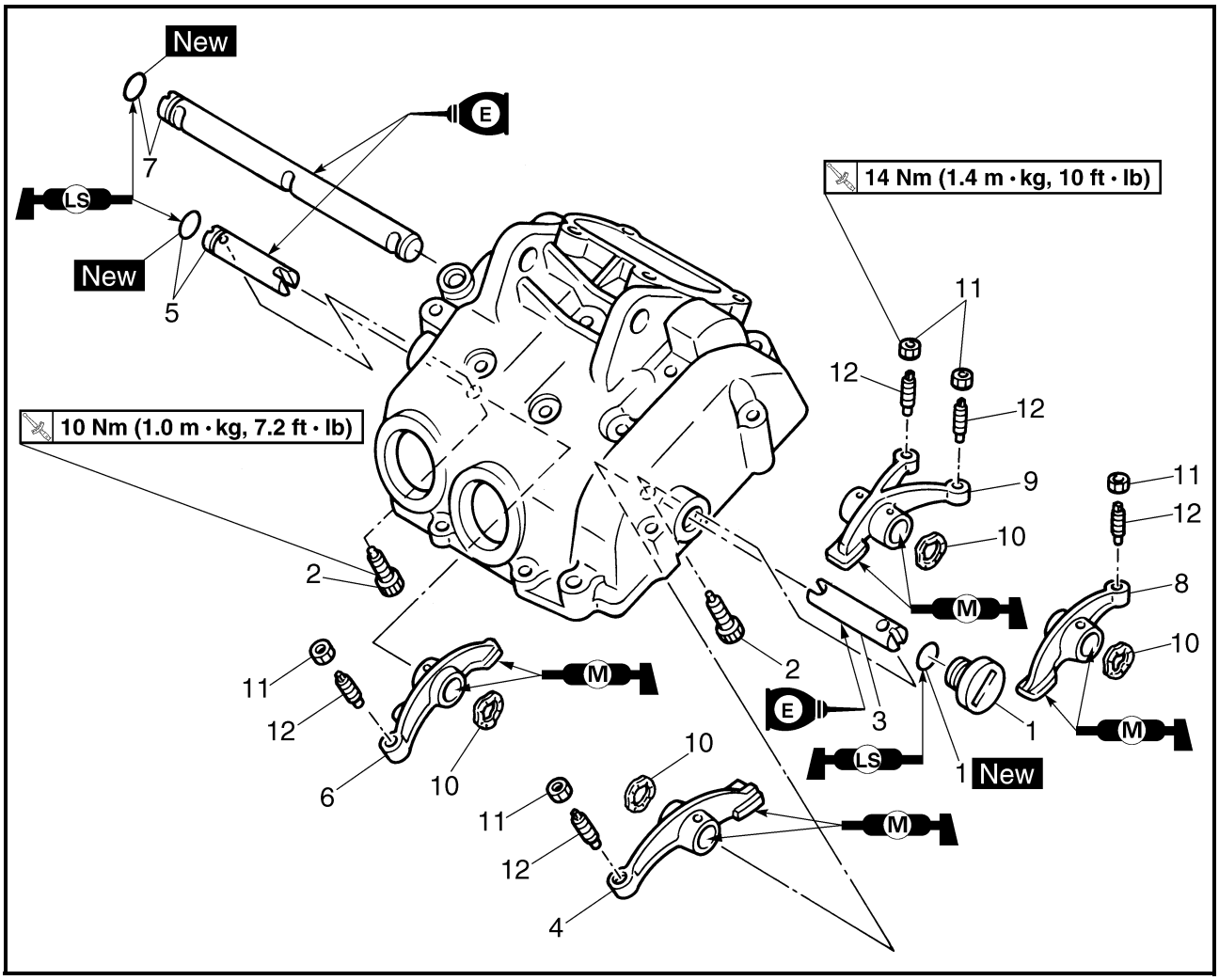
	Sealant (Quick Gasket®) **P/N. ACC-11001-05-01** **Yamaha bond No. 1215** **P/N. 90890-85505**

2. Install:
   - cylinder head cover
   - washers ①
   - bolts — **10 Nm (1.0 m · kg, 7.2 ft · lb)**

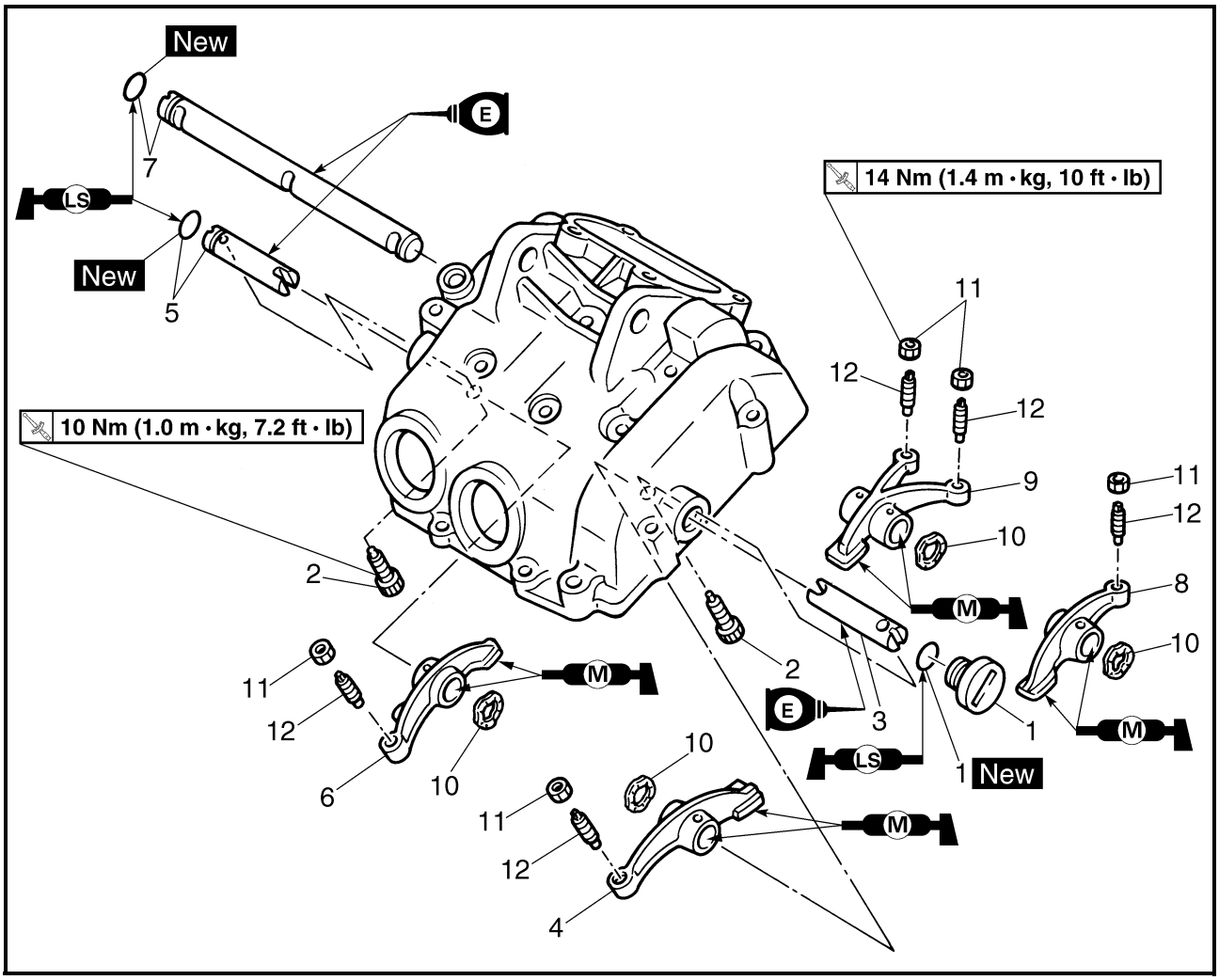
② Bolt: ℓ = 25 mm
③ Bolt: ℓ = 40 mm
④ Bolt: ℓ = 55 mm
⑤ Bolt: ℓ = 55 mm
⑥ Bolt: ℓ = 115 mm
⑦ Bolt: ℓ = 130 mm

NOTE:
Tighten the cylinder head cover bolts in stages, using a crisscross pattern.

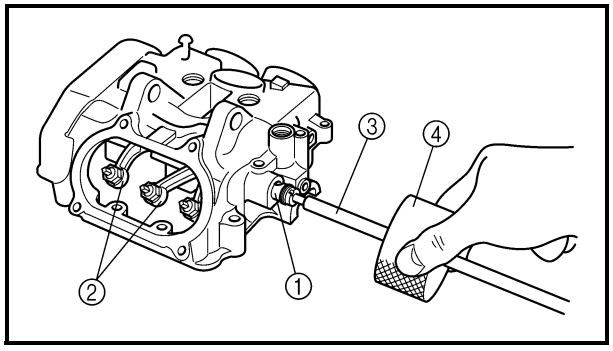
ROCKER ARMS



Order	Job/Part	Q'ty	Remarks
	Removing the rocker arms		Remove the parts in the order listed.
	Cylinder head cover		Refer to "CYLINDER HEAD COVER".
1	Plug/O-ring	1/1	
2	Rocker arm shaft stopper	2	
3	Rocker arm shaft 2	1	Refer to "REMOVING THE ROCKER ARMS" and "INSTALLING THE ROCKER ARMS".
4	Rocker arm 3	1	
5	Rocker arm shaft 3/O-ring	1/1	
6	Rocker arm 4	1	
7	Rocker arm shaft 1/O-ring	1/1	
8	Rocker arm 1	1	
9	Rocker arm 2	1	



Order	Job/Part	Q'ty	Remarks
10	Wave washer	4	
11	Locknut	5	
12	Valve adjuster	5	
			For installation, reverse the removal procedure.



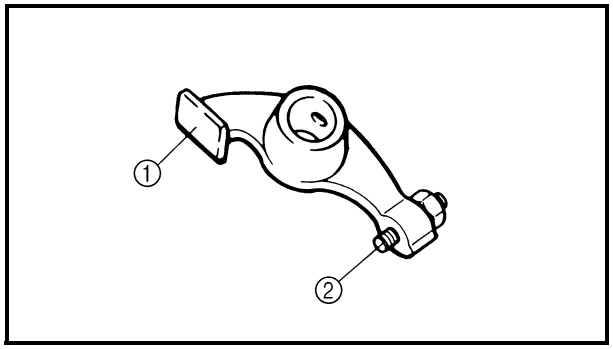
REMOVING THE ROCKER ARMS

1. Remove:
   - rocker arm shafts ①
   - rocker arms ②

NOTE:

Use a slide hammer bolt ③ and weight ④ to remove the rocker arm shafts.

Slide hammer set
P/N. YU-01083-A
Slide hammer bolt (M6)
P/N. 90890-01083
Weight
P/N. 90890-01084



CHECKING THE ROCKER ARMS

1. Check:
   - rocker arm lobes ①
   - valve adjusters ②
     Blue discoloration/pitting/scratches → Replace.
2. Check:
   - rocker arms
   - rocker arm shafts
     Damage/wear → Replace.

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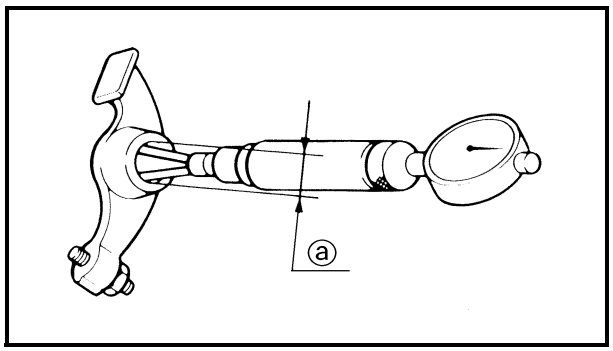
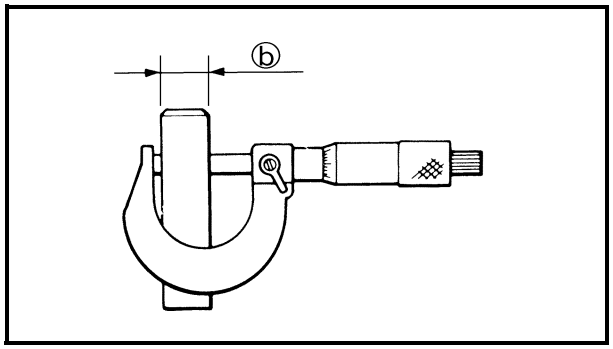
a. Check the two contact areas on the rocker arms for signs of abnormal wear.
1) Rocker arm shaft hole
2) Camshaft lobe contact surface
   Excessive wear → Replace.
b. Check the surface of the rocker arm shafts.
   Blue discoloration/pitting/scratches → Replace/check lubrication.
c. Measure the inside diameter ⓐ of the rocker arm holes.
   Out of specification → Replace.



Rocker arm inside diameter
12.000 ~ 12.018 mm
(0.4724 ~ 0.4731 in)



d. Measure the outside diameter ⓑ of the rocker arm shafts.
Out of specification → Replace.

Rocker arm shaft outside diameter
11.976 ~ 11.991 mm
(0.4715 ~ 0.4721 in)

e. Calculate the clearance by subtracting the rocker arm shaft outside diameter from the rocker arm inside diameter.
Out of specification → Replace the defective part(s).

Rocker arm to shaft standard clearance
0.009 ~ 0.042 mm
(0.0004 ~ 0.0017 in)

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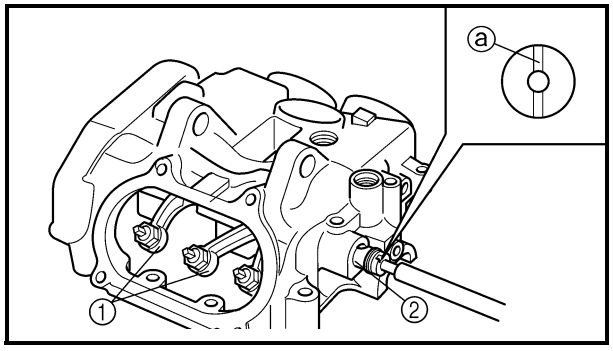


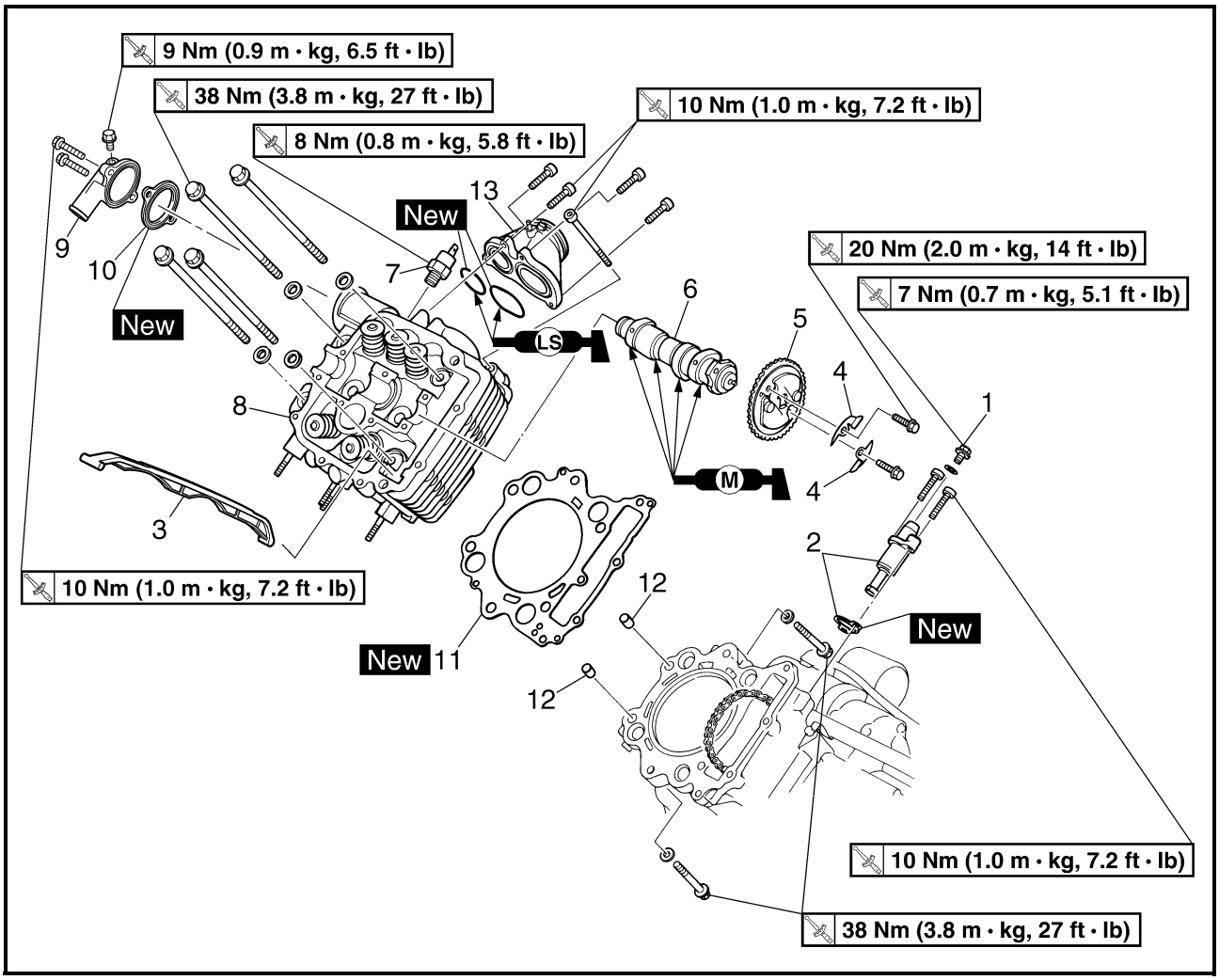
INSTALLING THE ROCKER ARMS

1. Install:
   - rocker arms ①
   - rocker arm shafts ②

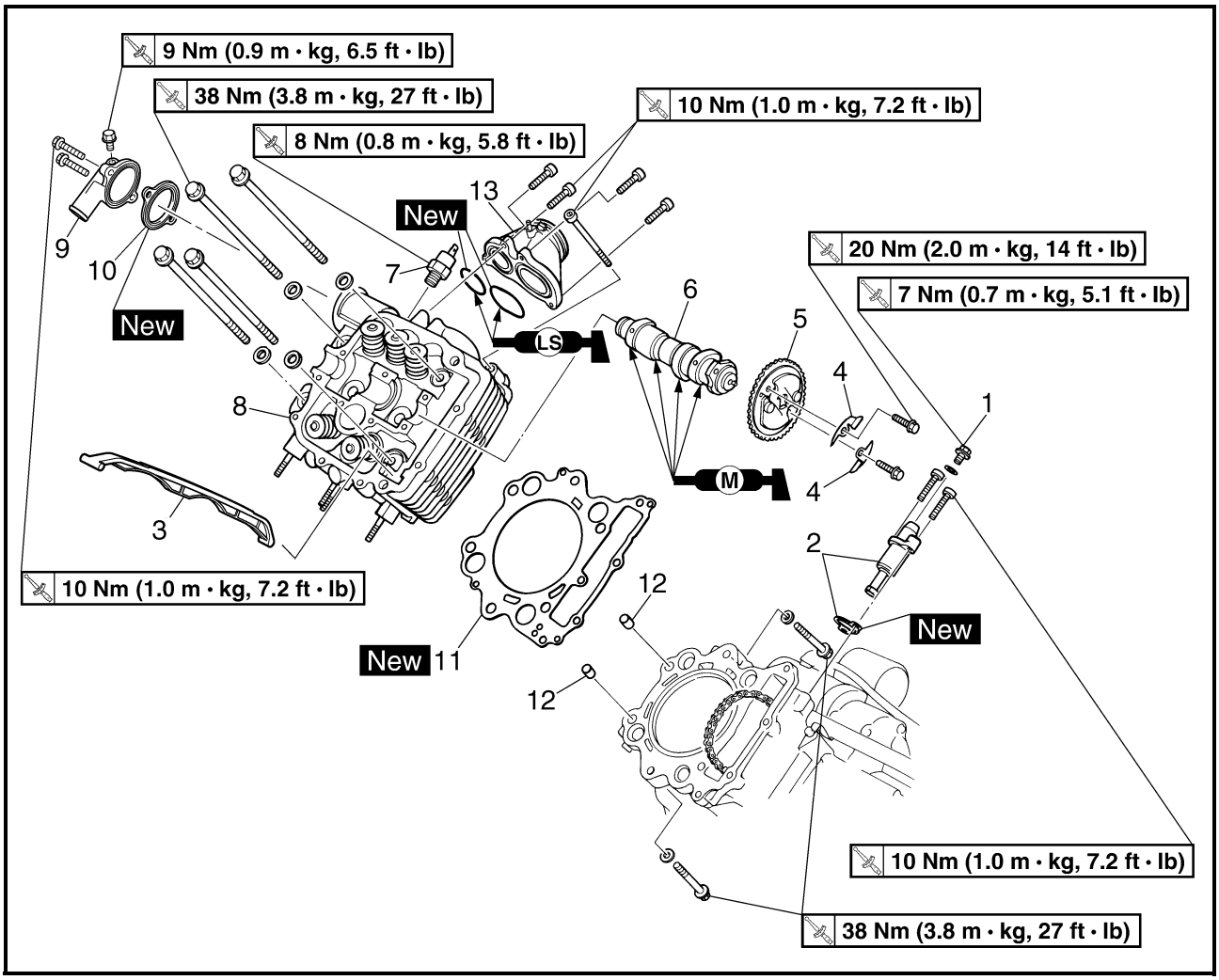
NOTE:

- The thread hole ⓐ of the rocker arm shaft must face to the outside.
- After installation, make sure that the thread hole ⓐ of the rocker arm shaft is positioned correctly, as shown in the illustration.

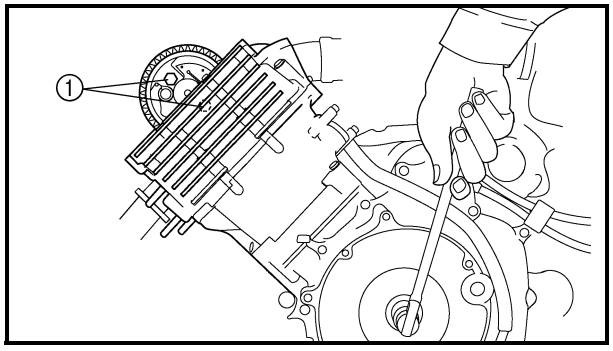
CAMSHAFT AND CYLINDER HEAD


9 Nm (0.9 m · kg, 6.5 ft · lb)
38 Nm (3.8 m · kg, 27 ft · lb)
8 Nm (0.8 m · kg, 5.8 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
20 Nm (2.0 m · kg, 14 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
38 Nm (3.8 m · kg, 27 ft · lb)
New
LS
M
1
2
3
4
5
6
7
8
9
10
11
12
13

Order	Job/Part	Q'ty	Remarks
	Removing the camshaft and cylinder head		Remove the parts in the order listed.
	Carburetor		Refer to "CARBURETOR" in chapter 6.
	Coolant outlet joint breather hose		Refer to "WATER PUMP" in chapter 5.
	Muffler/exhaust pipe/thermo switch 1 lead		Refer to "ENGINE REMOVAL".
	Cylinder head cover		Refer to "CYLINDER HEAD COVER".
1	Timing chain tensioner cap bolt	1	Refer to "REMOVING THE CAMSHAFT AND CYLINDER HEAD" and "INSTALLING THE CAMSHAFT AND CYLINDER HEAD".
2	Timing chain tensioner/gasket	1/1	
3	Timing chain guide (exhaust side)	1	
4	Decompressor cam guide plate	2	
5	Camshaft sprocket	1	
6	Camshaft	1	


9 Nm (0.9 m · kg, 6.5 ft · lb)
38 Nm (3.8 m · kg, 27 ft · lb)
8 Nm (0.8 m · kg, 5.8 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
20 Nm (2.0 m · kg, 14 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
38 Nm (3.8 m · kg, 27 ft · lb)
New
LS
M
1
2
3
4
5
6
7
8
9
10
11
12
13

Order	Job/Part	Q'ty	Remarks
7	Thermo switch 1	1	
8	Cylinder head	1	
9	Coolant outlet joint	1	
10	Gasket	1	
11	Cylinder head gasket	1	
12	Dowel pin	2	
13	Intake manifold	1	
			For installation, reverse the removal procedure.

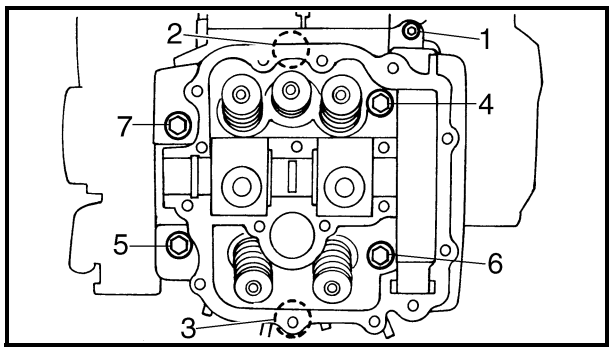


REMOVING THE CAMSHAFT AND CYLINDER HEAD

1. Loosen:
   - camshaft sprocket bolts ①
2. Loosen:
   - timing chain tensioner cap bolt
3. Remove:
   - timing chain tensioner
   - timing chain guide (exhaust side)
   - decompressor cam guide plates
   - camshaft sprocket
   - camshaft

NOTE:

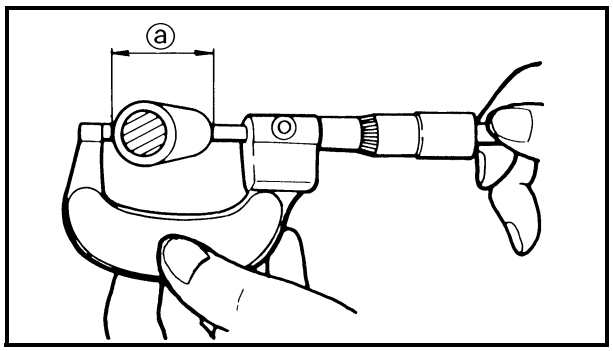
- Fasten a safety wire to the timing chain to prevent it from falling into the crankcase.
- When removing the camshaft sprocket, it is not necessary to separate the timing chain.

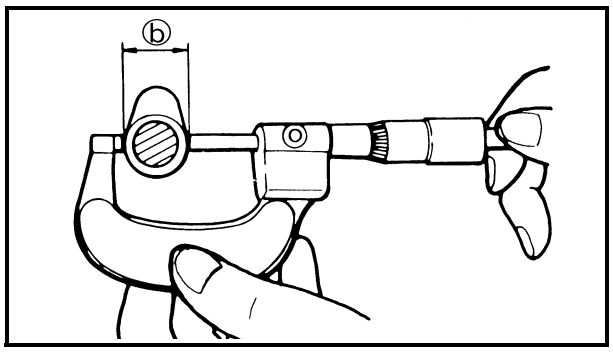


4. Remove:
   - cylinder head

NOTE:

- Loosen the bolts in the proper sequence.
- Follow the numerical order shown in the illustration. Loosen each bolt 1/4 of a turn at a time until all of the bolts are loose.

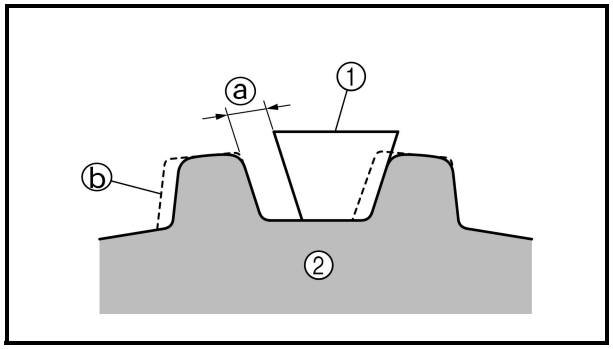




CHECKING THE CAMSHAFT

1. Check:
   - cam lobes
     Pitting/scratches/blue discoloration → Replace.
2. Measure:
   - cam lobe dimensions ⓐ and ⓑ
     Out of specification → Replace.

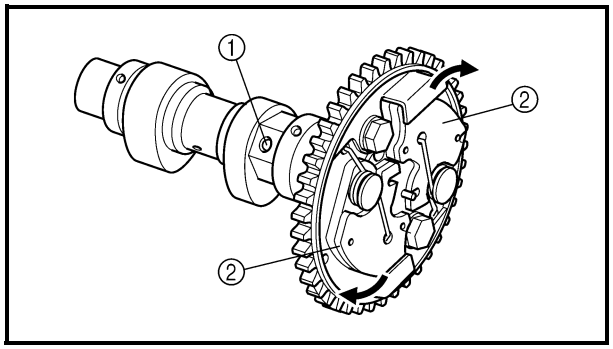
Camshaft lobe limit
Intake
ⓐ 35.59 mm (1.4012 in)
ⓑ 29.96 mm (1.1795 in)
Exhaust
ⓐ 36.40 mm (1.4331 in)
ⓑ 30.01 mm (1.1815 in)



CHECKING THE CAMSHAFT SPROCKET

1. Check:
   - camshaft sprocket
     Wear/damage → Replace the camshaft sprocket and timing chain as a set.

ⓐ 1/4 of a tooth
ⓑ Correct
① Timing chain
② Sprocket



CHECKING THE DECOMPRESSION SYSTEM

1. Check:
   - decompression system

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Check while the camshaft sprocket is installed on the camshaft.

a. Check that the decompressor lever pin ① projects from the camshaft.
b. Check that the decompressor cam ② moves smoothly.

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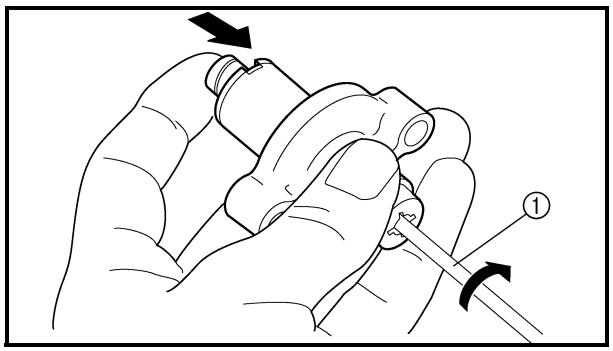
CHECKING THE TIMING CHAIN GUIDE (EXHAUST SIDE)

1. Check:
   - timing chain guide (exhaust side)
     Wear/damage → Replace.

CHECKING THE TIMING CHAIN TENSIONER

1. Check:
   - timing chain tensioner
     Cracks/damage/rough movement → Replace.



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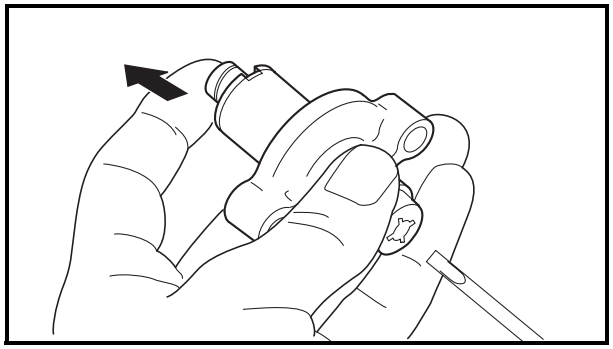
a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

NOTE:

While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver ① until it stops.



b. Removing the screwdriver and slowly release the timing chain tensioner rod.
c. Make sure that the timing chain tensioner rod comes out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.

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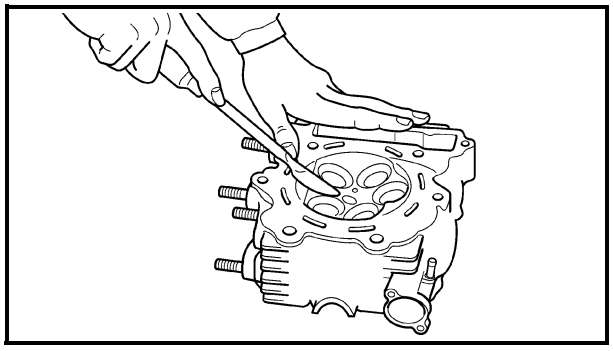


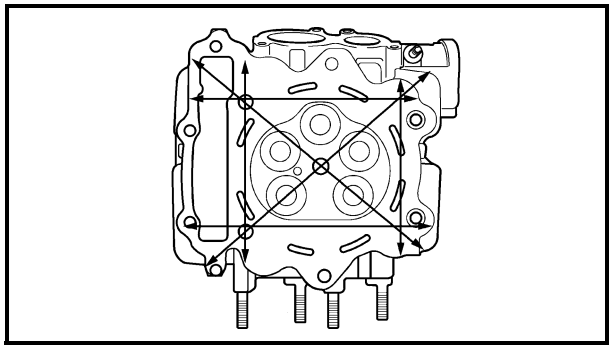
CHECKING THE CYLINDER HEAD

1. Eliminate:
   • carbon deposits (from the combustion chamber)
   Use a rounded scraper.

NOTE:

Do not use a sharp instrument to avoid damaging or scratching:
• spark plug threads
• valve seats

2. Check:
   • cylinder head
   Scratches/damage → Replace the cylinder head cover and cylinder head as a set.
   • cylinder head water jacket
   Mineral deposits/rust → Eliminate.



3. Measure:
   • cylinder head warpage
   Out of specification → Resurface.

Cylinder head warpage
Less than 0.03 mm (0.0012 in)

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a. Place a straightedge and a thickness gauge across the cylinder head.
b. Use a thickness gauge to measure the warpage.
c. If the warpage is out of specification, resurface the cylinder head.

d. Place a 400 ~ 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

NOTE:

To ensure an even surface rotate the cylinder head several times.

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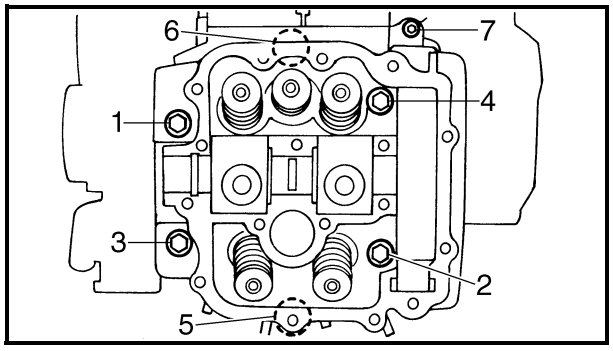


INSTALLING THE CAMSHAFT AND CYLINDER HEAD

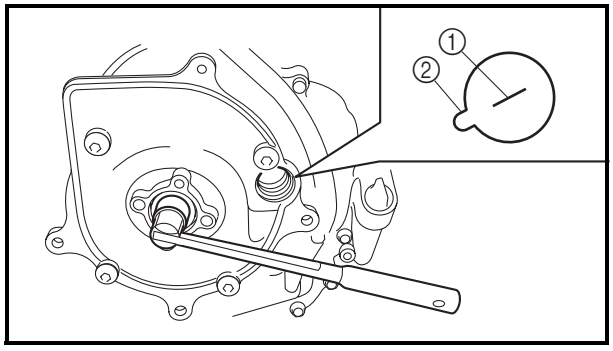
1. Install:
   - cylinder head gasket New
   - cylinder head
   - bolts (M9: 1 ~ 6)

     38 Nm (3.8 m · kg, 27 ft · lb)
   - bolt (M6: 7)

     10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:

- Tighten the bolts in the proper sequence.
- Follow the numerical order shown in the illustration. Tighten the bolts in two stages.



2. Install:
   - camshaft
   - camshaft sprocket

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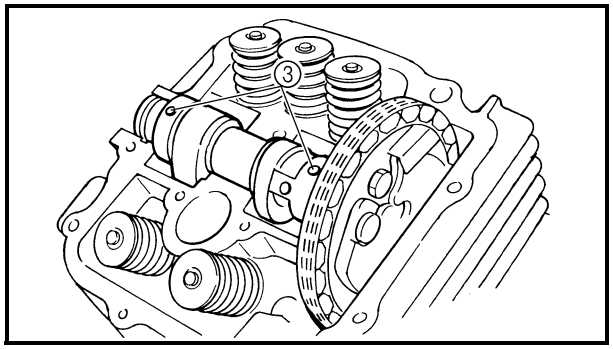
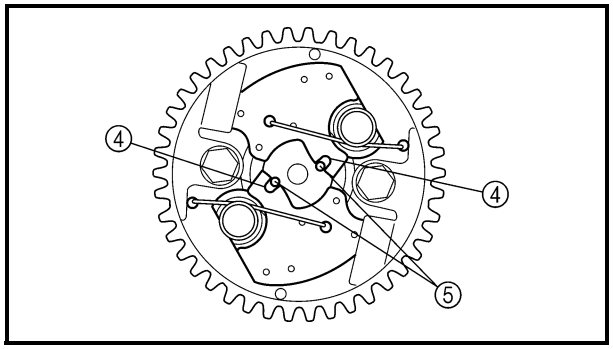
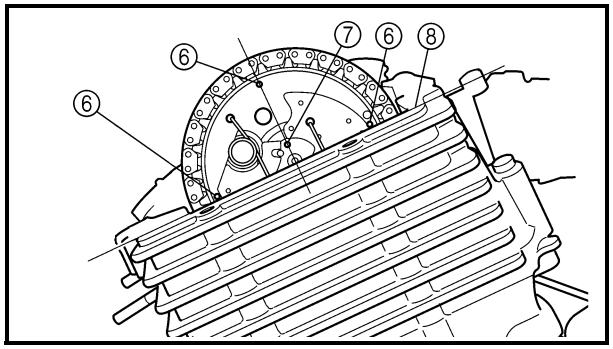
a. Turn the crankshaft counterclockwise with a wrench.
b. Align the "I" mark ① on the rotor with the stationary pointer ② on the A.C. magneto cover. When the "I" mark is aligned with the stationary pointer, the piston is at the Top Dead Center (TDC).

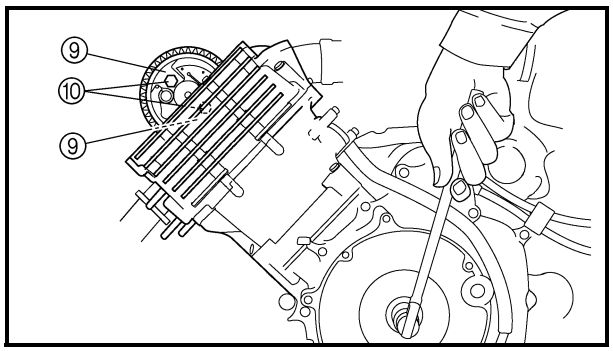
CAUTION:

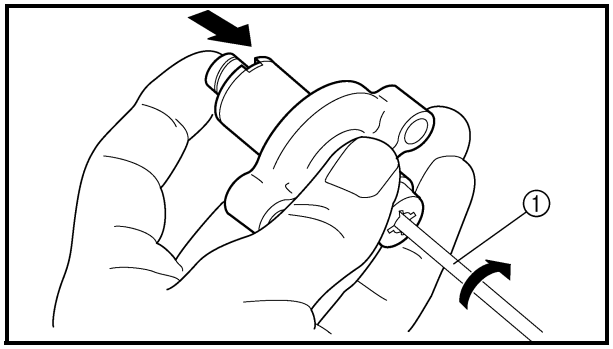
Do not turn the crankshaft during the camshaft installation.











c. Temporarily install the camshaft sprocket on the camshaft. (Do not install the bolts.) Then, install the timing chain on the camshaft sprocket.

NOTE:
Make sure the small holes ③ on the camshaft face upward.

d. Align the notches ④ on the decompressor cams with the projections ⑤ on the decompressor spring lever, then install the camshaft sprocket on the camshaft.

NOTE:
Check that each part is positioned as shown in the illustration.

⑥ Small holes on camshaft sprocket
⑦ Punch mark on decompressor spring lever
⑧ Top front of cylinder head

e. Install the decompressor cam guide plates ⑨ and camshaft sprocket bolts ⑩.

	Camshaft sprocket bolt **20 Nm (2.0 m · kg, 14 ft · lb)**

NOTE:
Insert a screwdriver into the timing chain tensioner hole and push the timing chain guide (intake side) inward.

f. Remove the retaining wire.

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3. Install:
   • timing chain guide (exhaust side)

4. Install:
   • timing chain tensioner

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a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.
b. While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver ① until it stops.

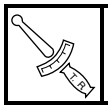
c. With the screwdriver still inserted into the timing chain tensioner, install the timing chain tensioner and gasket onto the cylinder block. Then, tighten the timing chain tensioner bolts to the specified torque.

⚠ WARNING

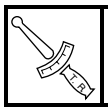
Always use a new gasket.

NOTE:

The "UP" mark on the timing chain tensioner should face up.

	**Timing chain tensioner bolt** **10 Nm (1.0 m · kg, 7.2 ft · lb)**

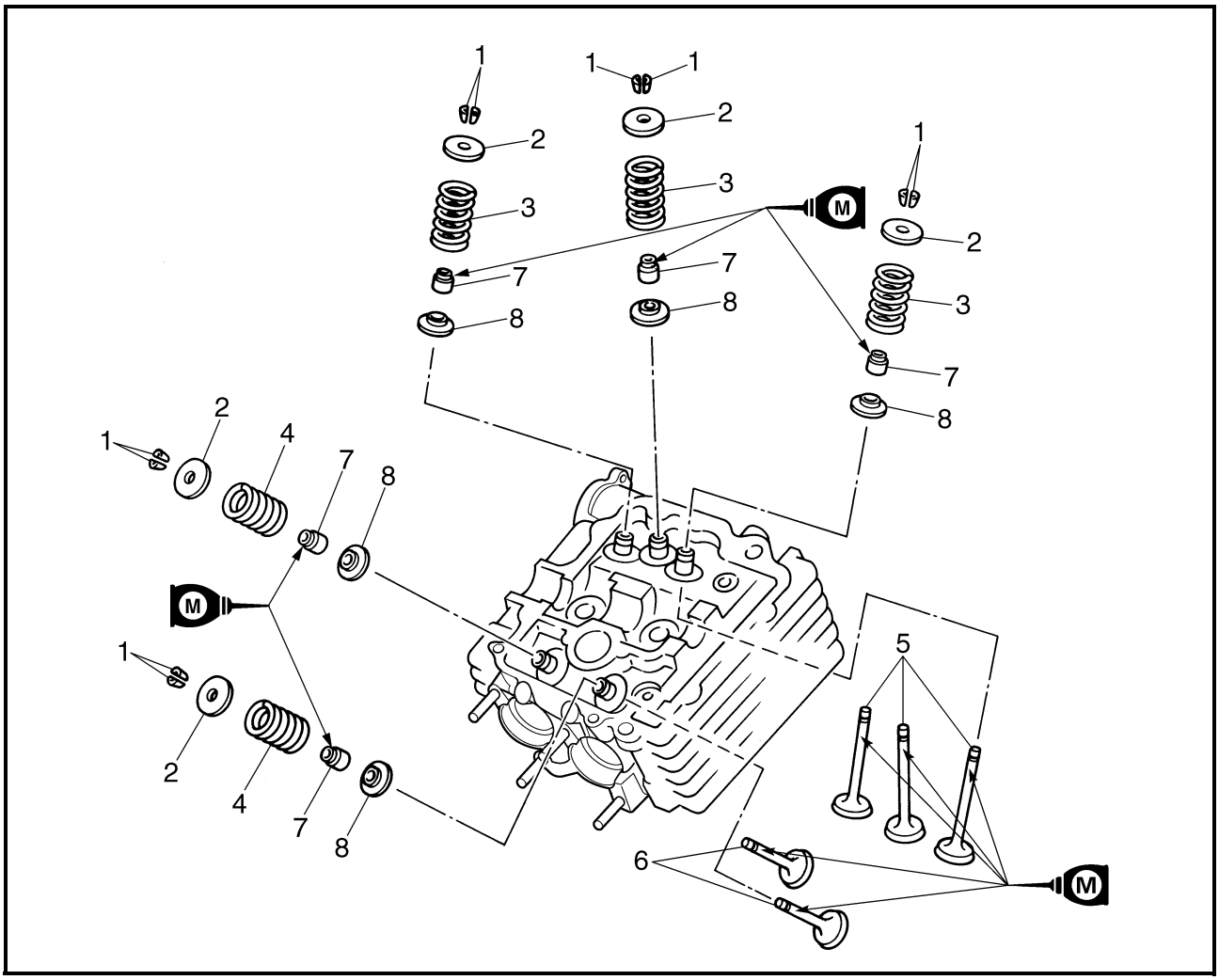
d. Remove the screwdriver, make sure that the timing chain tensioner rod releases, and tighten the cap bolt to the specified torque.

	**Timing chain tensioner cap bolt** **7 Nm (0.7 m · kg, 5.7 ft · lb)**

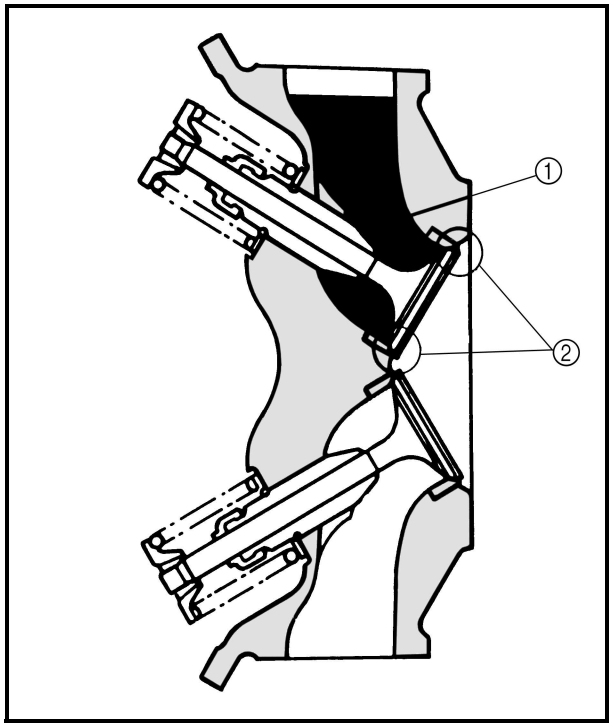
5. Check:
   - small holes on camshaft sprocket
   - rotor "I" mark

   Out of alignment → Adjust.

VALVES AND VALVE SPRINGS



Order	Job/Part	Q'ty	Remarks
	Removing the valves and valve springs		Remove the parts in the order listed.
	Cylinder head		Refer to "CAMSHAFT AND CYLINDER HEAD".
1	Valve cotter	10	Refer to "REMOVING THE VALVES AND VALVE SPRINGS" and "INSTALLING THE VALVES AND VALVE SPRINGS".
2	Valve spring retainer	5	
3	Intake valve spring	3	
4	Exhaust valve spring	2	
5	Intake valve	3	
6	Exhaust valve	2	
7	Valve stem seal	5	
8	Valve spring seat	5	
			For installation, reverse the removal procedure.



REMOVING THE VALVES AND VALVE SPRINGS

1. Check:
   - valve sealing
     Leakage at the valve seat → Check the valve face, valve seat and valve seat width.
     Refer to "CHECKING THE VALVES AND VALVE SPRINGS".

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a. Pour a clean solvent ① into the intake and exhaust ports.
b. Check that the valve seals properly.
   There should be no leakage at the valve seat ②.

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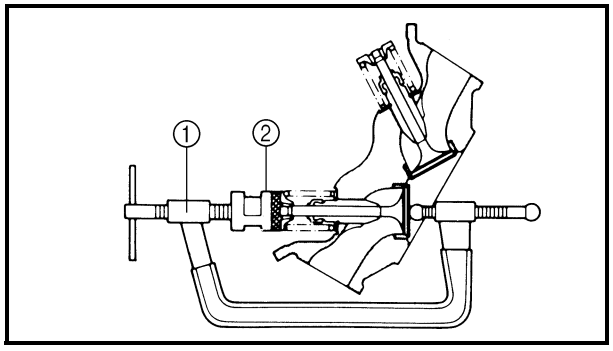
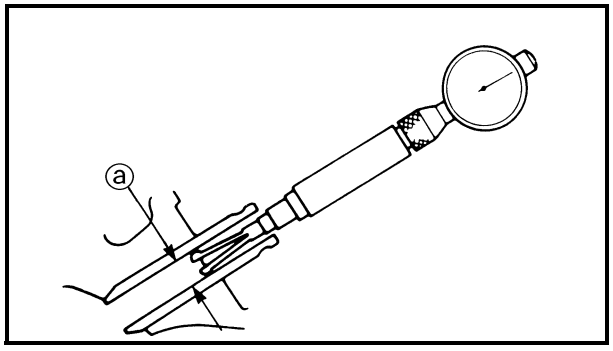
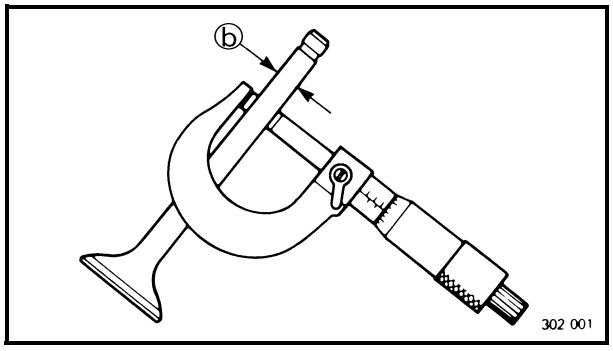


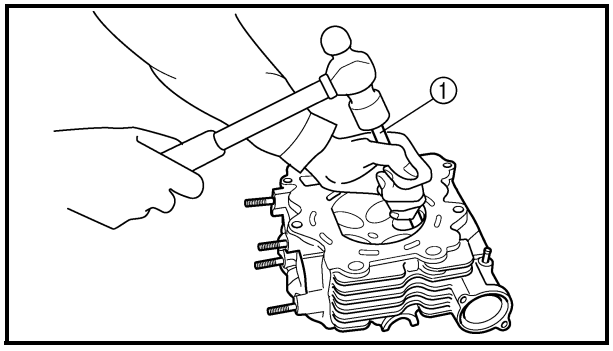
2. Remove:
   - valve cotters

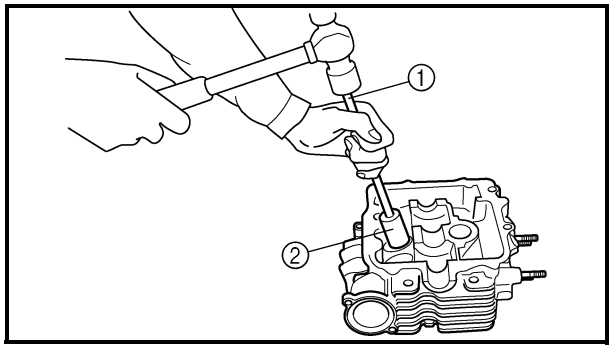
NOTE:
Attach a valve spring compressor ① and valve spring compressor attachment ② between the valve spring retainer and the cylinder head to remove the valve cotters.

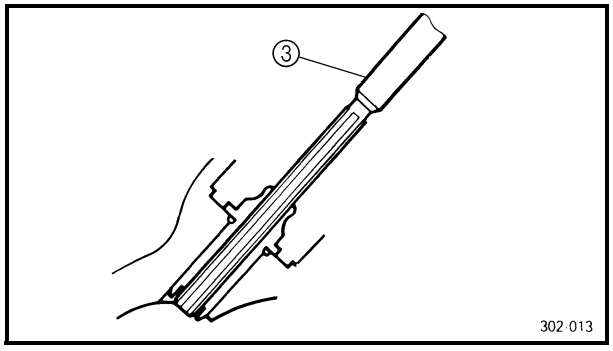
Valve spring compressor set
P/N. YM-04019
Valve spring compressor
P/N. 90890-04019
Valve spring compressor attachment
P/N. YM-01253-1, 90890-01243











CHECKING THE VALVES AND VALVE SPRINGS

1. Measure:
   - stem-to-guide clearance

Stem-to-guide clearance =
valve guide inside diameter ⓐ –
valve stem diameter ⓑ

Out of specification → Replace the valve guide.

Stem-to-guide clearance
Intake
0.010 ~ 0.037 mm
(0.0004 ~ 0.0015 in)
<Limit>: 0.08 mm (0.0031 in)
Exhaust
0.025 ~ 0.052 mm
(0.0010 ~ 0.0020 in)
<Limit>: 0.10 mm (0.0039 in)

2. Replace:
   - valve guide

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NOTE:
To ease guide removal, installation and to maintain correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

a. Remove the valve guide using a valve guide remover ①.
b. Install the new valve guide using a valve guide remover ① and valve guide installer ②.
c. After installing the valve guide, bore the valve guide using a valve guide reamer ③ to obtain proper stem-to-guide clearance.

Valve guide remover (ø 6)
P/N. YM-04064-A, 90890-04064
Valve guide installer (ø 6)
P/N. YM-04065-A, 90890-04065
Valve guide reamer (ø 6)
P/N. YM-04066, 90890-04066

NOTE:
After replacing the valve guide reface the valve seat.

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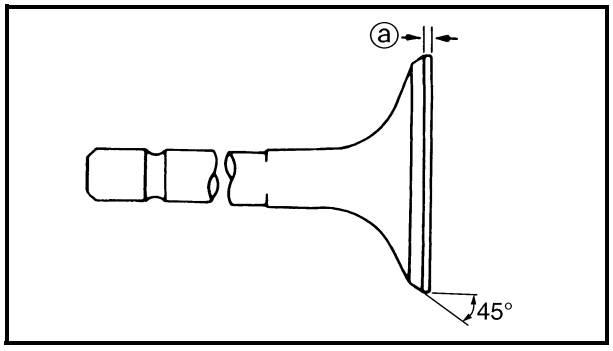
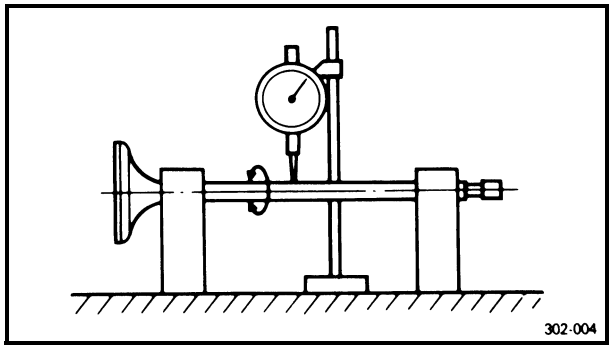
3. Check:
   - valve face
     Pitting/wear → Grind the face.
   - valve stem end
     Mushroom shape or diameter larger than the body of the stem → Replace.



4. Measure:
   - margin thickness ⓐ
     Out of specification → Replace.

Margin thickness
Intake
0.85 ~ 1.15 mm
(0.0335 ~ 0.0453 in)
Exhaust
0.85 ~ 1.15 mm
(0.0335 ~ 0.0453 in)

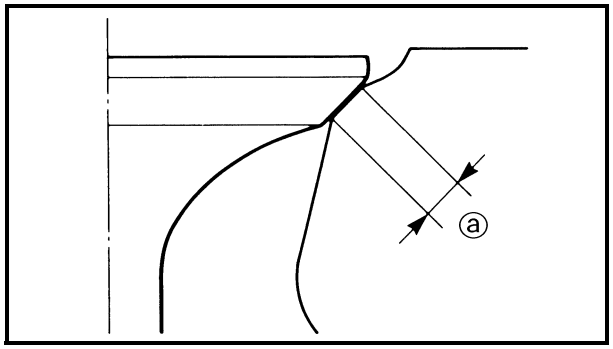


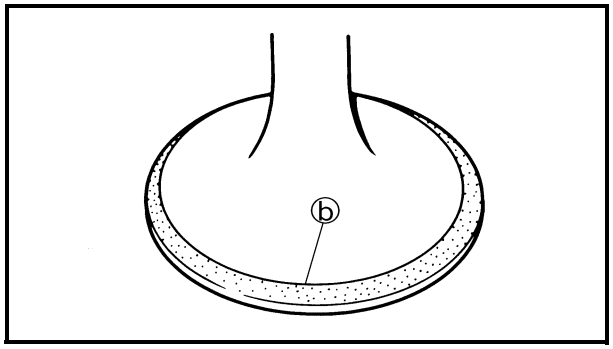
5. Measure:
   - valve stem runout
     Out of specification → Replace.

Runout limit
0.01 mm (0.0004 in)

NOTE:
- When installing a new valve always replace the guide.
- If the valve is removed or replaced always replace the oil seal.

6. Eliminate:
   - carbon deposits
     (from the valve face and valve seat)
7. Check:
   - valve seats
     Pitting/wear → Reface the valve seat.





8. Measure:
   • valve seat width ⓐ
   Out of specification → Reface the valve seat.

Valve seat width
Intake
0.9 ~ 1.1 mm
(0.0354 ~ 0.0433 in)
<Limit>: 1.6 mm (0.0630 in)
Exhaust
0.9 ~ 1.1 mm
(0.0354 ~ 0.0433 in)
<Limit>: 1.6 mm (0.0630 in)

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a. Apply Mechanic's blueing dye (Dykem) ⓑ to the valve face.
b. Install the valve into the cylinder head.
c. Press the valve through the valve guide and onto the valve seat to make a clear pattern.
d. Measure the valve seat width. Where the valve seat and valve face made contact, blueing will have been removed.
e. If the valve seat is too wide, too narrow, or the seat is not centered, the valve seat must be refaced.

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9. Lap:
   • valve face
   • valve seat

NOTE:
After refacing the valve seat or replacing the valve and valve guide, the valve seat and valve face should be lapped.

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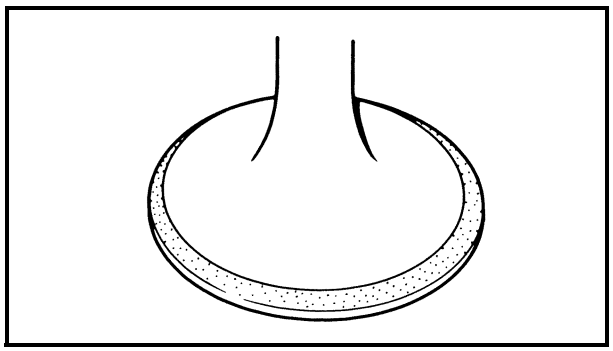
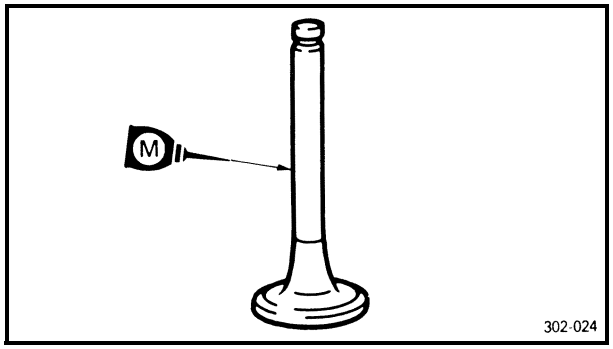
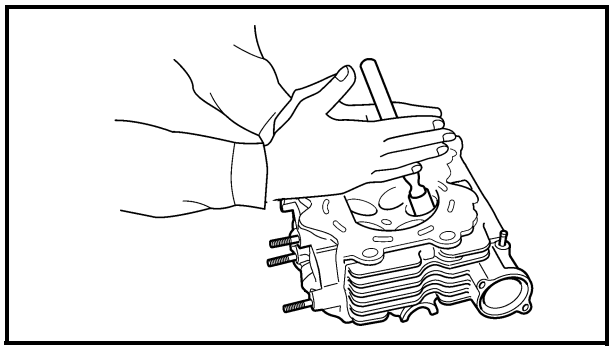
a. Apply a coarse lapping compound to the valve face.

CAUTION:
Do not let the compound enter the gap between the valve stem and the guide.



b. Apply molybdenum disulfide oil to the valve stem.





c. Install the valve into the cylinder head.
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the compound.

NOTE:
For best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

e. Apply a fine lapping compound to the valve face and repeat the above steps.

NOTE:
After every lapping operation be sure to clean off all of the compound from the valve face and valve seat.

f. Apply Mechanic's blueing dye (Dykem) to the valve face.
g. Install the valve into the cylinder head.
h. Press the valve through the valve guide and onto the valve seat to make a clear pattern.
i. Measure the valve seat width again. If the valve seat width is out of specification, reface and relap the valve seat.

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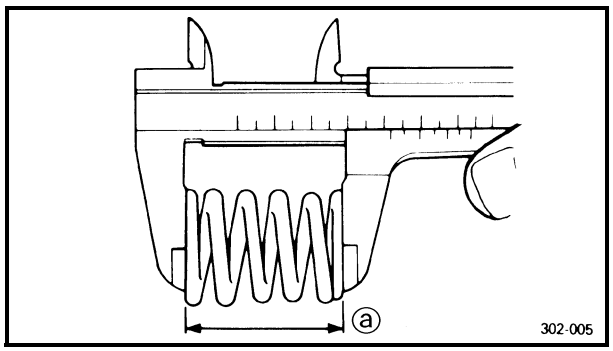
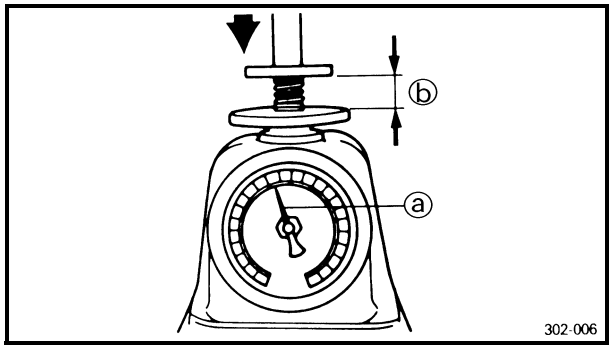


10.Measure:
- valve spring free length ⓐ
  Out of specification → Replace.

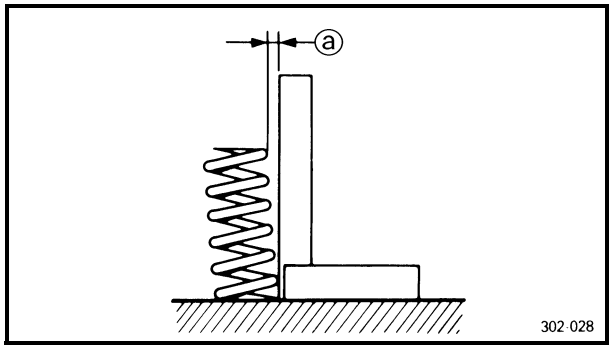
Valve spring free length
Intake
32.63 mm (1.28 in)
<Limit>: 31.0 mm (1.22 in)
Exhaust
36.46 mm (1.44 in)
<Limit>: 34.6 mm (1.36 in)



11.Measure:
- compressed spring force ⓐ
  Out of specification → Replace.

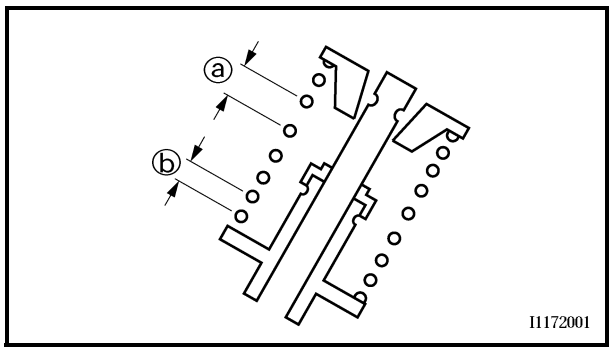
ⓑ Installed length

Compressed spring force
Intake
100.0 ~ 115.7 N at 27.5 mm
(10.20 ~ 11.80 kg,
22.49 ~ 26.01 lb at 1.08 in)
Exhaust
120.6 ~ 138.3 N at 31.0 mm
(12.30 ~ 14.10 kg,
27.12 ~ 31.09 lb at 1.22 in)



12.Measure:
- spring tilt ⓐ
  Out of specification → Replace.

Spring tilt limit
Intake
2.5°/1.4 mm (0.055 in)
Exhaust
2.5°/1.6 mm (0.063 in)

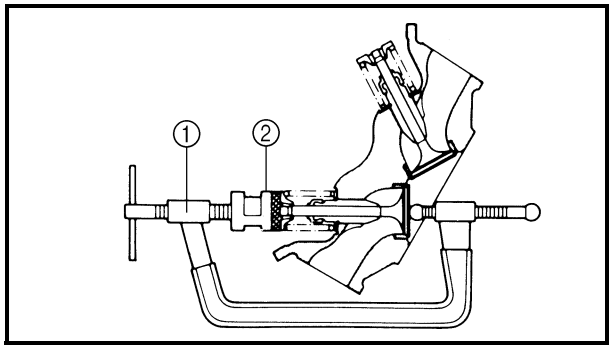


INSTALLING THE VALVES AND VALVE SPRINGS

1. Apply:
   - molybdenum disulfide oil
     (onto the valve stem and valve stem seal)
2. Install:
   - valve spring seats
   - valve stem seals New
   - valves
   - valve springs
   - valve spring retainers

NOTE:
Install the valve springs with the larger pitch ⓐ facing upwards.

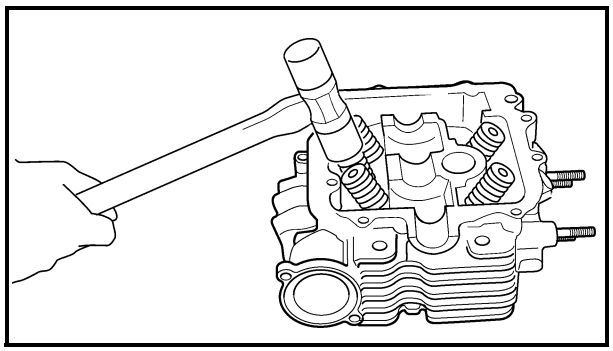
ⓑ Smaller pitch



3. Install:
   • valve cotters

NOTE:
Install the valve cotters while compressing the valve spring with the valve spring compressor ① and valve spring compressor attachment ②.

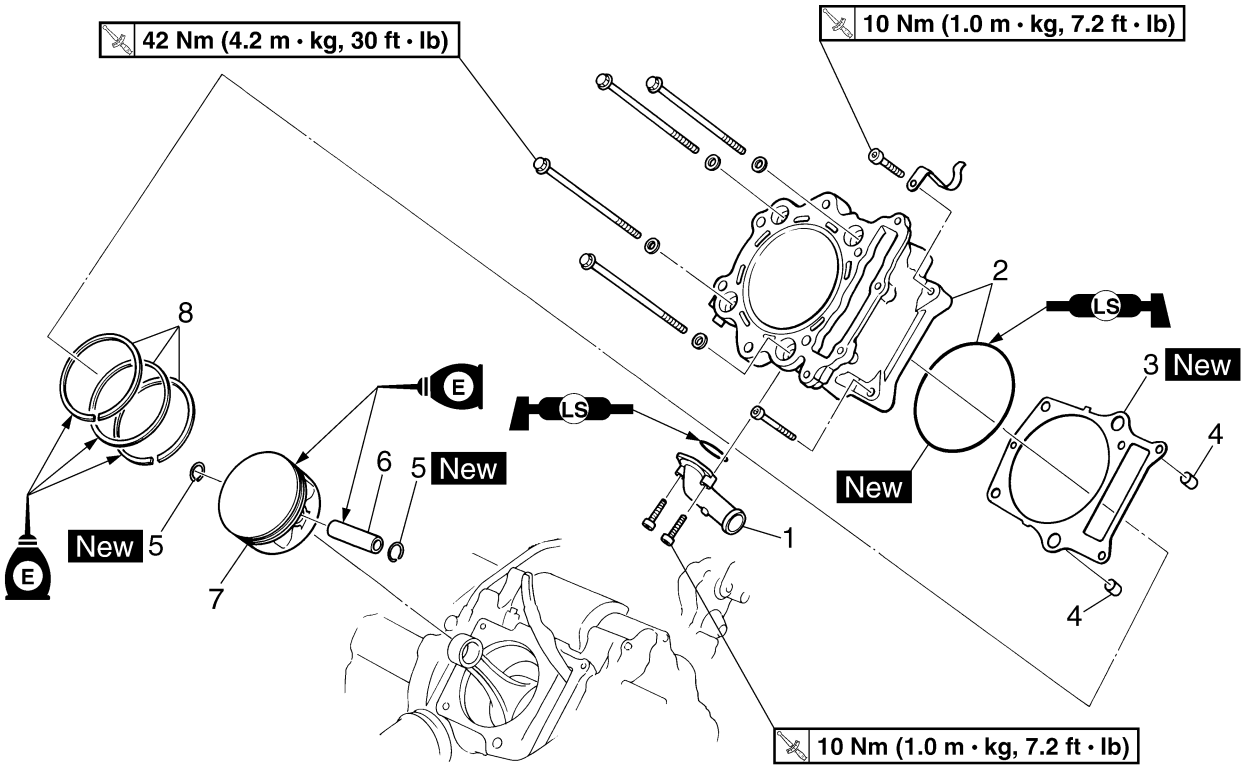
Valve spring compressor set
P/N. YM-04019
Valve spring compressor
P/N. 90890-04019
Valve spring compressor attachment
P/N. YM-01253-1, 90890-01243



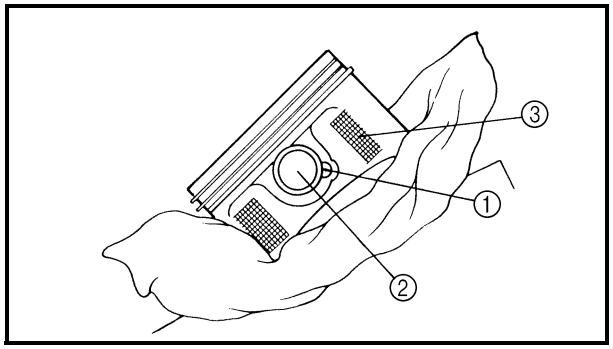
4. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a piece of wood.

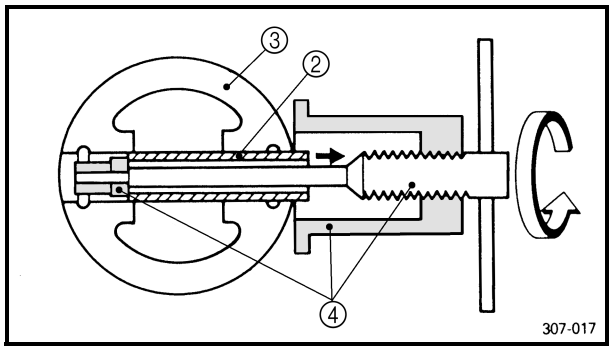
CAUTION:
Hitting the valve tip with excessive force could damage the valve.

CYLINDER AND PISTON



Order	Job/Part	Q'ty	Remarks
	Removing the cylinder and piston		Remove the parts in the order listed.
	Water pump outlet hose		Refer to "WATER PUMP" in chapter 5.
	Cylinder head		Refer to "CAMSHAFT AND CYLINDER HEAD".
1	Coolant inlet joint	1	
2	Cylinder/O-ring	1/1	Refer to "INSTALLING THE CYLINDER".
3	Cylinder gasket	1	
4	Dowel pin	2	
5	Piston pin clip	2	
6	Piston pin	1	Refer to "REMOVING THE PISTON" and "INSTALLING THE PISTON".
7	Piston	1	
8	Piston ring set	1	
			For installation, reverse the removal procedure.





REMOVING THE PISTON

1. Remove:
   - piston pin clips ①
   - piston pin ②
   - piston ③

NOTE:

Before removing piston pin, deburr the clip groove and pin hole area. If the piston pin groove is deburred and the piston pin is still difficult to remove, use the piston pin puller ④.

	Piston pin puller **P/N. YU-01304, 90890-01304**

CAUTION:

Do not use a hammer to drive the piston pin out.

2. Remove:
   - piston rings

NOTE:

Spread the end gaps apart while at the same time lifting the piston ring over the top of the piston crown.

CHECKING THE CYLINDER AND PISTON

1. Check:
   - cylinder and piston walls
     Vertical scratches → Rebore or replace the cylinder and the piston.
2. Measure:
   - piston-to-cylinder clearance

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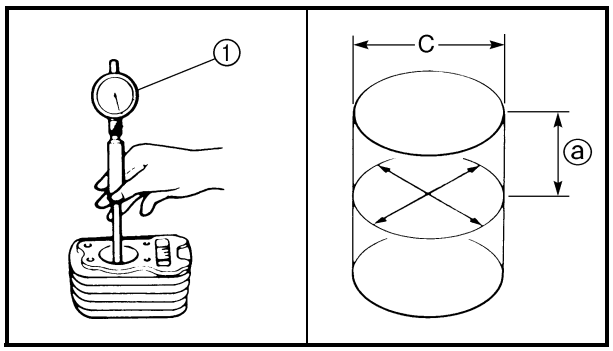
1st step:

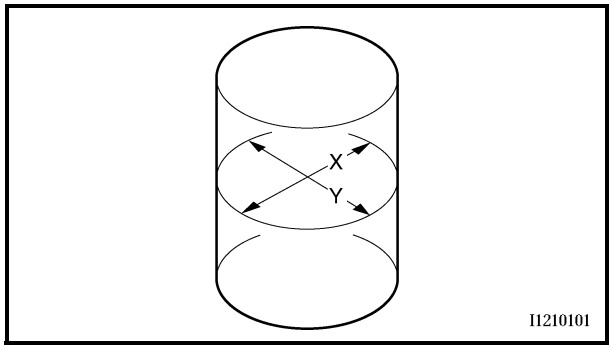
a. Measure the cylinder bore "C" with a cylinder bore gauge ①.

ⓐ 50 mm (2.0 in) from the top of the cylinder

NOTE:

Measure cylinder bore "C" in parallel to and at right angles to the cylinder matching surface. Then, find the average of the measurements.

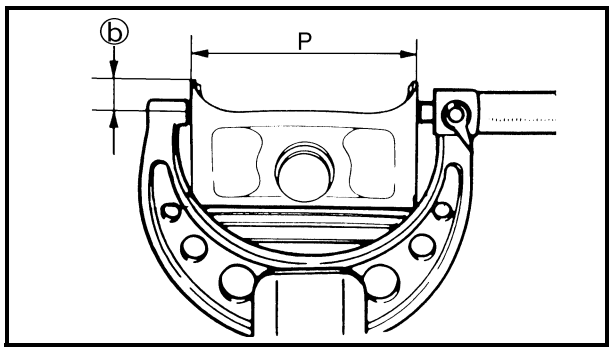




	Standard	Wear limit
Cylinder bore "C"	100.005 ~ 100.055 mm (3.9372 ~ 3.9392 in)	100.10 mm (3.9410 in)

$$C = \frac{X + Y}{2}$$

b. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.



2nd step:

a. Measure piston skirt diameter "P" with a micrometer.

ⓑ 2.5 mm (0.10 in) from the piston bottom edge

Piston skirt diameter "P"	
Standard	99.945 ~ 99.995 mm (3.9348 ~ 3.9368 in)

b. If out of specification, replace the piston and piston rings as a set.

3rd step:

a. Find the piston-to-cylinder clearance with the following formula.

Piston-to-cylinder clearance =
Cylinder bore "C" –
Piston skirt diameter "P"

Piston-to-cylinder clearance
0.050 ~ 0.070 mm
(0.0020 ~ 0.0028 in)
<Limit>: 0.15 mm (0.0059 in)

b. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.

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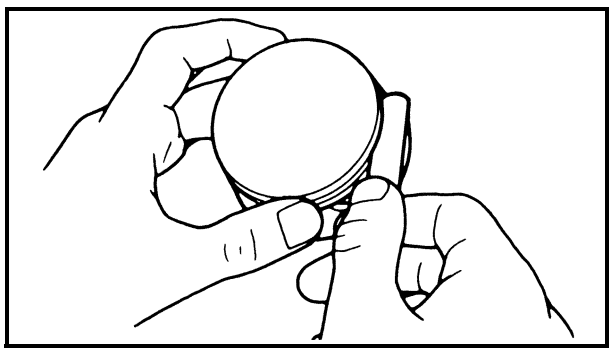


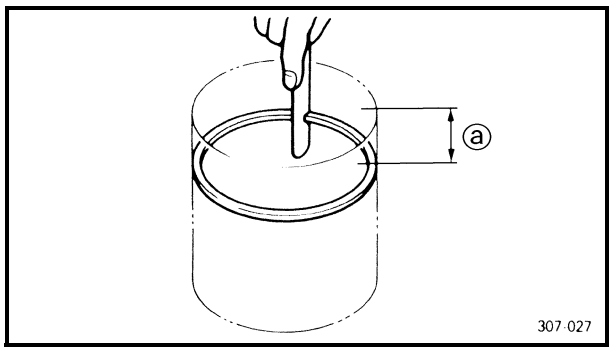
CHECKING THE PISTON RINGS

1. Measure:
   - ring side clearance
     Use a thickness gauge.
     Out of specification → Replace the piston and rings as a set.

NOTE:

Clean carbon from the piston ring grooves and rings before measuring the side clearance.

	Side clearance	
	Standard	**Limit**
Top ring	**0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)**	**0.13 mm (0.0051 in)**
2nd ring	**0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)**	**0.13 mm (0.0051 in)**



2. Position:
   - piston ring
     (in cylinder)

NOTE:

Insert a ring into the cylinder and push it approximately 50 mm (2.0 in) into the cylinder. Push the ring with the piston crown so that the ring will be at a right angle to the cylinder bore.

ⓐ 50 mm (2.0 in)

3. Measure:
   - ring end gap
     Out of specification → Replace.

NOTE:

You cannot measure the end gap on the expander spacer of the oil control ring. If the oil control ring rails show excessive gap, replace all three rings.

	End gap	
	Standard	**Limit**
Top ring	**0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in)**	**0.70 mm (0.0276 in)**
2nd ring	**0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in)**	**0.80 mm (0.0315 in)**
Oil ring	**0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in)**	**—**

CHECKING THE PISTON PIN

1. Check:
   - piston pin
     Blue discoloration/grooves → Replace, then check the lubrication system.
2. Measure:
   - piston pin-to-piston clearance

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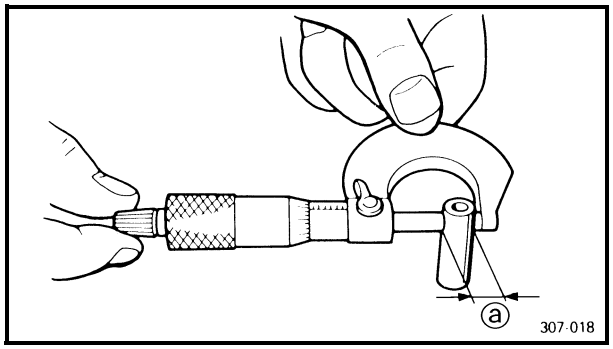
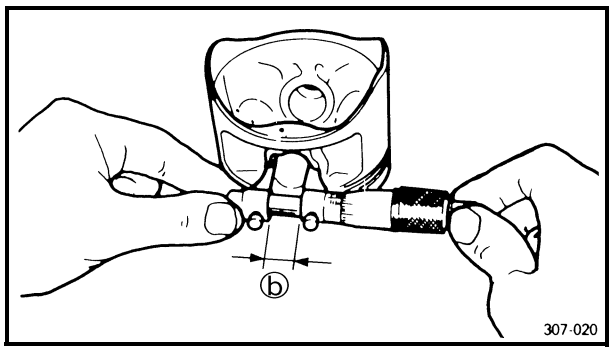
a. Measure the piston pin outside diameter ⓐ.
   If out of specification, replace the piston pin.



Piston pin outside diameter
21.991 ~ 22.000 mm
(0.8658 ~ 0.8661 in)
<Limit>: 21.971 mm (0.8650 in)

b. Measure the piston pin bore inside diameter ⓑ.



Piston pin bore inside diameter
22.004 ~ 22.015 mm
(0.8663 ~ 0.8667 in)
<Limit>: 22.045 mm (0.8679 in)

c. Calculate the piston pin-to-piston clearance with the following formula.

Piston pin-to-piston clearance =
Piston pin bore inside diameter ⓑ –
Piston pin outside diameter ⓐ

d. If out of specification, replace the piston.

Piston pin-to-piston clearance
0.004 ~ 0.024 mm
(0.00016 ~ 0.00094 in)
<Limit>: 0.074 mm (0.00291 in)

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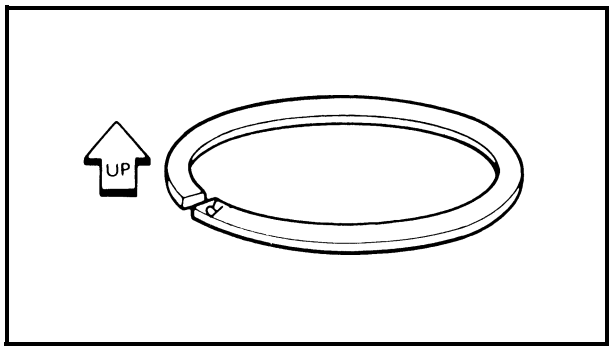
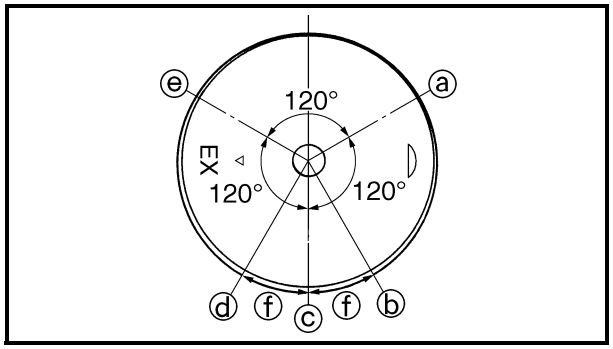
INSTALLING THE PISTON

1. Install:
   - piston rings
     (onto the piston)

NOTE:

- Be sure to install the piston rings so that the manufacturer's marks or numbers are located on the upper side of the rings.
- Lubricate the piston and piston rings liberally with engine oil.

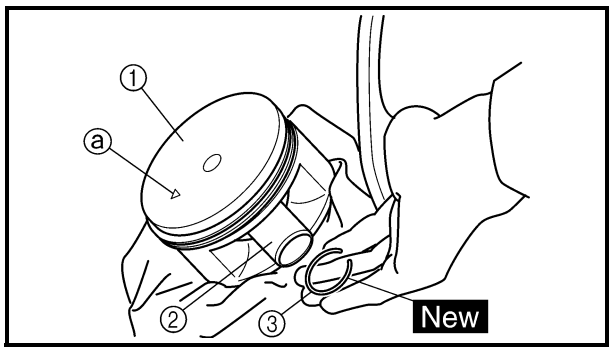




2. Position:
   - top ring
   - 2nd ring
   - oil ring

   Offset the piston ring end gaps as shown.

ⓐ Top ring end
ⓑ Upper oil ring rail end
Ⓒ Oil ring expander end
ⓓ Lower oil ring rail end
ⓔ 2nd ring end
ⓕ 20 mm (0.79 in)

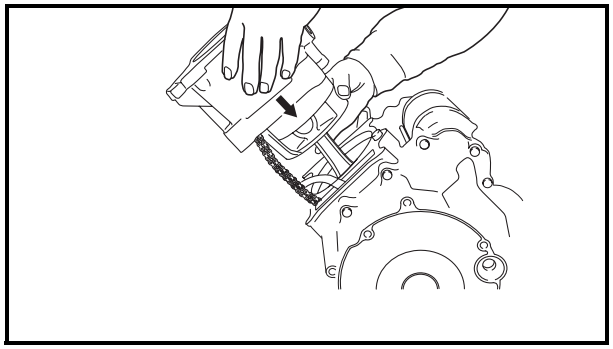


3. Install:
   - piston ①
   - piston pin ②
   - piston pin clips ③ New

NOTE:
- Apply engine oil onto the piston pin, piston rings and piston.
- Be sure that the arrow mark ⓐ on the piston points to the exhaust side of the engine.
- Before installing the piston pin clip, cover the crankcase with a clean rag to prevent the piston pin clip from falling into the crankcase.

4. Lubricate:
   - piston
   - piston rings
   - cylinder

NOTE:
Apply a liberal coating of engine oil.



INSTALLING THE CYLINDER

1. Install:
   - cylinder
   - O-ring New
   - bolts (M10) **42 Nm (4.2 m · kg, 30 ft · lb)**
   - bolts (M6) **10 Nm (1.0 m · kg, 7.2 ft · lb)**

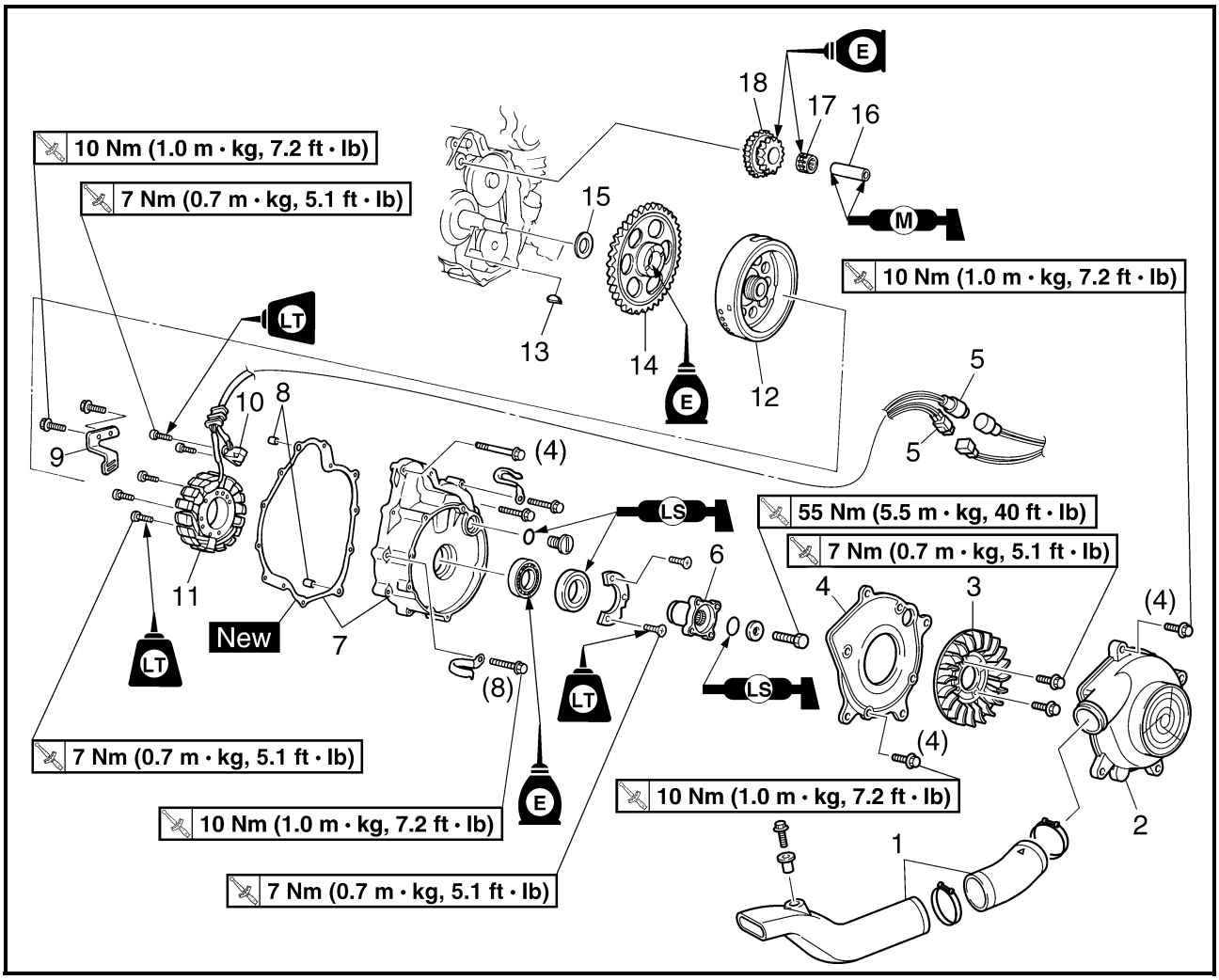
NOTE:

Install the cylinder with one hand while compressing the piston rings with the other hand.

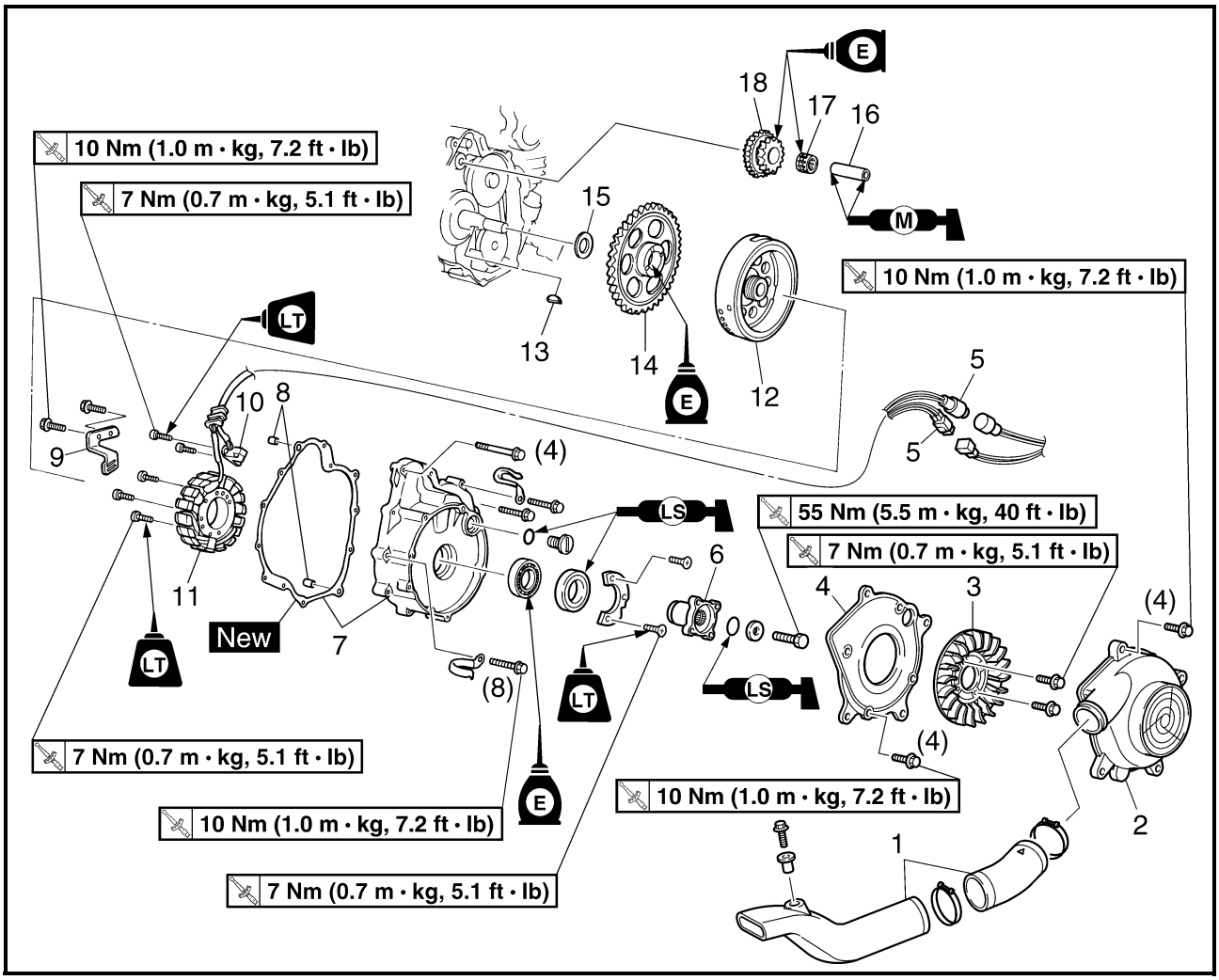
CAUTION:

- **Be careful not to damage the timing chain guide during installation.**
- **Pass the timing chain through the timing chain cavity.**

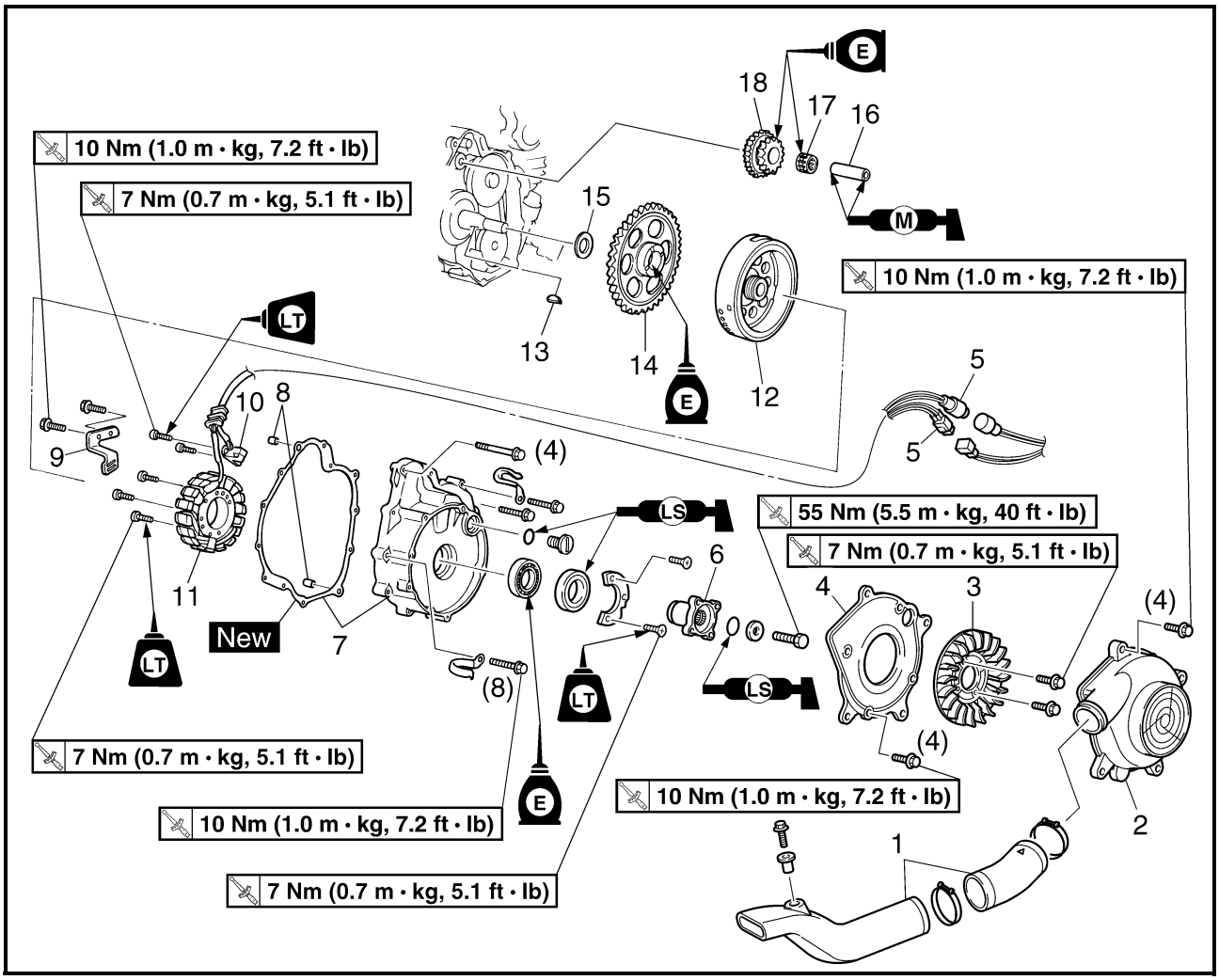
ENGINE COOLING FAN AND A.C. MAGNETO


10 Nm (1.0 m · kg, 7.2 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
55 Nm (5.5 m · kg, 40 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
New
E
M
LT
LS

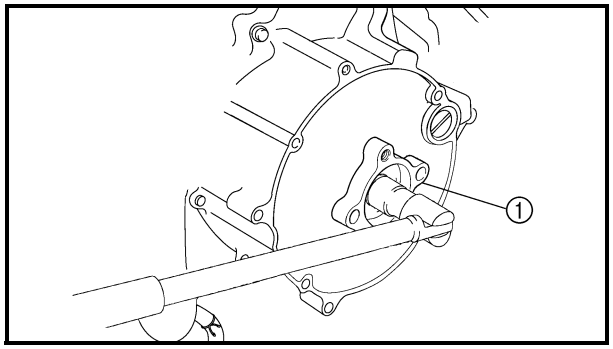
Order	Job/Part	Q'ty	Remarks
	Removing the engine cooling fan and A.C. magneto		Remove the parts in the order listed.
	Driver seat/passenger seat/console		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
	Drive belt cover		Refer to "PRIMARY AND SECONDARY SHEAVES".
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Water pump assembly		Refer to "WATER PUMP" in chapter 5.
1	Engine cooling fan air duct assembly	1	
2	Air shroud 1	1	


10 Nm (1.0 m · kg, 7.2 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
55 Nm (5.5 m · kg, 40 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
New
LT
LS
E
M

Order	Job/Part	Q'ty	Remarks
3	Engine cooling fan	1	
4	Air shroud 2	1	
5	A.C. magneto coupler	2	Disconnect.
6	Engine cooling fan pulley base	1	Refer to "REMOVING THE A.C. MAGNETO" and "INSTALLING THE A.C. MAGNETO".
7	A.C. magneto cover/gasket	1/1	
8	Dowel pin	2	
9	Stator lead holder	1	
10	Pickup coil	1	
11	Stator assembly	1	
12	A.C. magneto rotor	1	Refer to "REMOVING THE A.C. MAGNETO" and "INSTALLING THE A.C. MAGNETO".
13	Woodruff key	1	
14	Starter wheel gear	1	
15	Washer	1	
16	Starter idle gear shaft	1	
17	Bearing	1	



Order	Job/Part	Q'ty	Remarks
18	Starter idle gear	1	For installation, reverse the removal procedure.

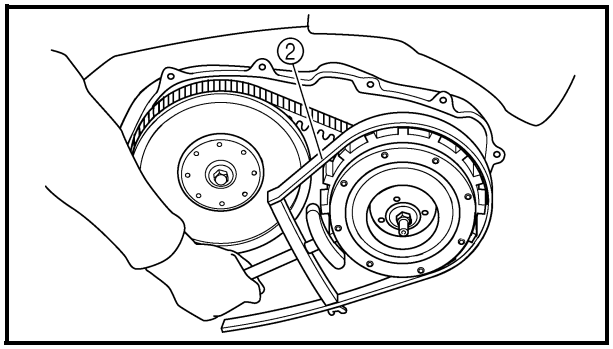


REMOVING THE A.C. MAGNETO

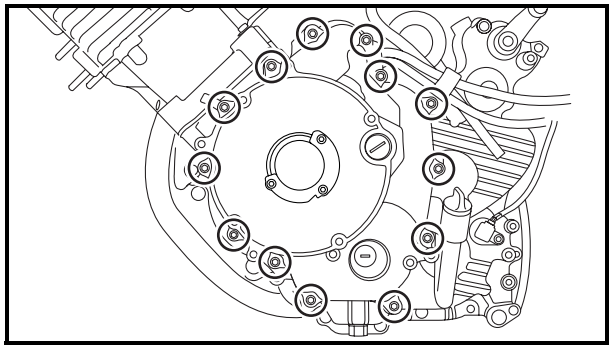
1. Remove:
   - engine cooling fan pulley ①

NOTE:

Use the sheave holder ② to hold the primary sheave.



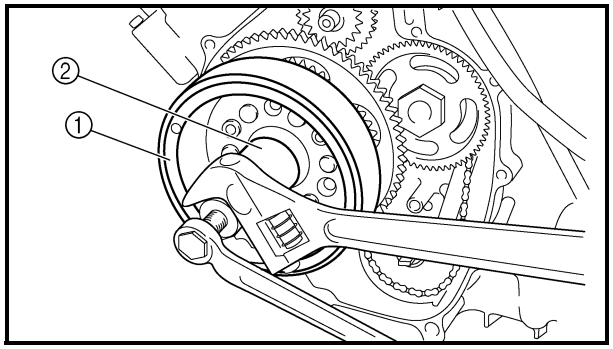
Primary sheave holder
P/N. YS-01880-A
Sheave holder
P/N. 90890-01701



2. Remove:
   - A.C. magneto cover
   - gasket
   - dowel pins

NOTE:

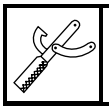
Working in a crisscross pattern, loosen each bolt 1/4 of a turn. Remove them after all of them are loosened.



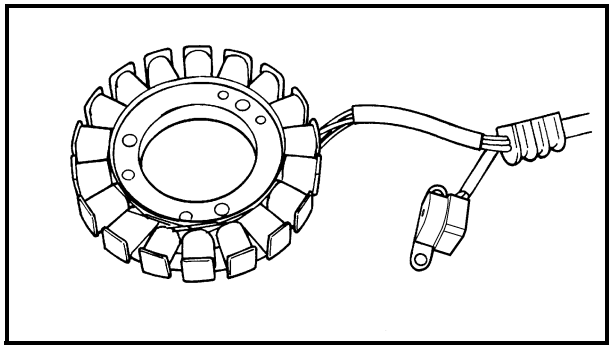
3. Remove:
   - A.C. magneto rotor ①

NOTE:

Use the flywheel puller ②.

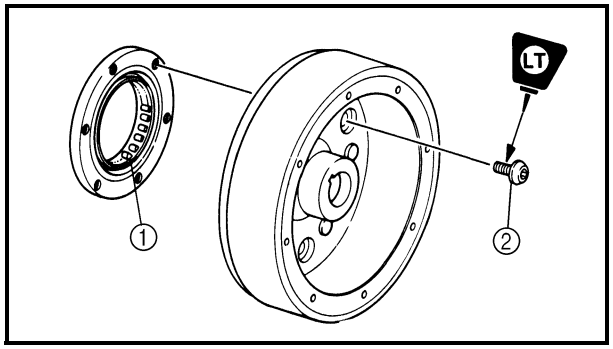


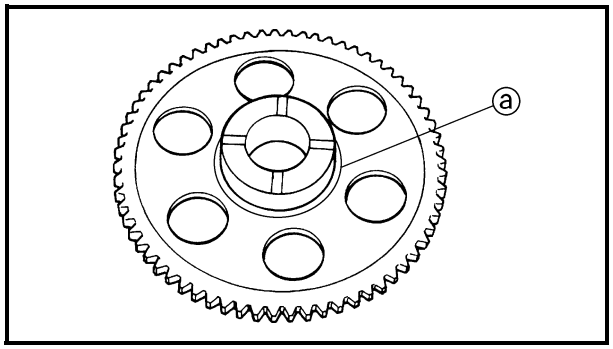
Flywheel puller
P/N. YM-01404, 90890-01404

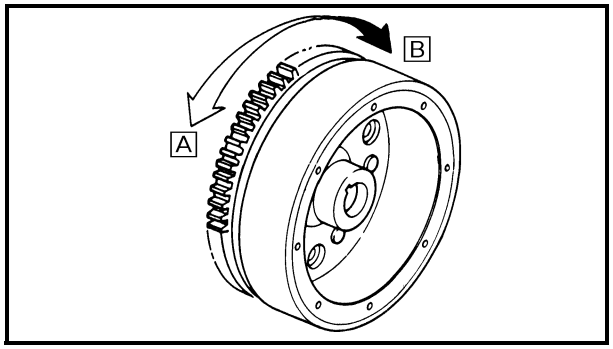


CHECKING THE A.C. MAGNETO

1. Check:
   - stator coil
   - pickup coil
     Damage → Replace.







CHECKING THE STARTER CLUTCH

1. Check:
   - starter clutch ①
     Cracks/damage → Replace.
   - starter clutch bolts ②
     Loose → Replace with new ones, and clinch the end of the bolts.

NOTE:

The arrow mark on the starter clutch must face inward, away from the A.C. magneto rotor.

Starter clutch bolts
30 Nm (3.0 m · kg, 22 ft · lb)
LOCTITE®

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a. Install the starter wheel gear onto the starter clutch, and hold the starter clutch.

NOTE:

Install the starter wheel gear with the groove ⓐ facing the A.C. magneto rotor.

b. Turn the starter wheel gear counterclockwise A to check that the starter clutch and wheel gear engage.
   If the starter clutch and wheel gear do not engage, replace the starter clutch.
c. Turn the starter wheel gear clockwise B to check the starter wheel gear for smooth operation.
   If operation is not smooth, replace the starter clutch.

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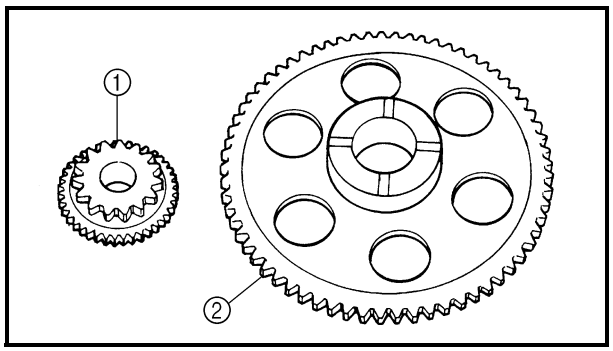
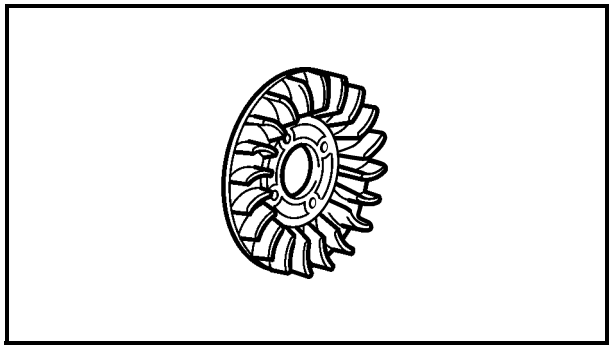


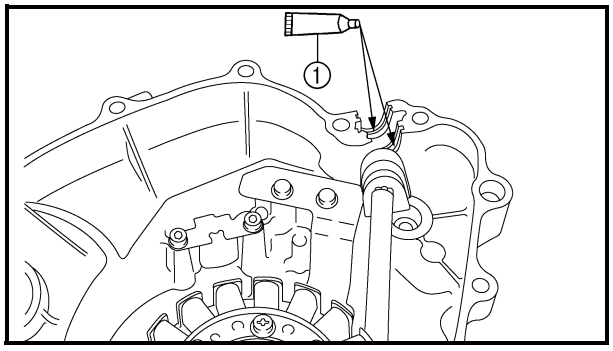
2. Check:
   - starter idle gear teeth ①
   - starter wheel gear teeth ②
     Burrs/clips/roughness/wear → Replace.
3. Check:
   - starter wheel gear
     (contacting surface)
     Damage/pitting/wear → Replace.



CHECKING THE ENGINE COOLING FAN

1. Check:
   - engine cooling fan
   - air shroud 1
   - air shroud 2

   Cracks/damage → Replace.



INSTALLING THE A.C. MAGNETO

1. Apply:
   - sealant (Quick Gasket®) ①

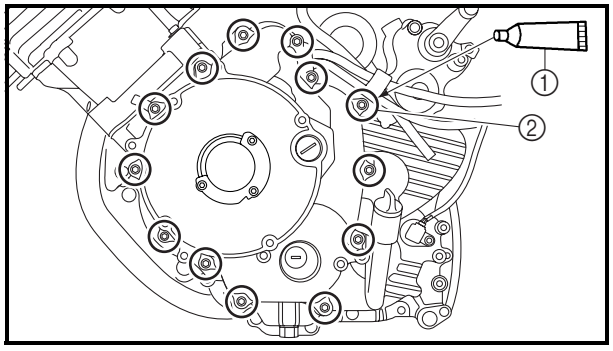
     (into the slit)

Sealant (Quick Gasket®)
P/N. ACC-11001-05-01
Yamaha bond No. 1215
P/N. 90890-85505

2. Install:
   - woodruff key
   - A.C. magneto rotor

NOTE:

- Before installing the rotor, clean the outside of the crankshaft and the inside of the rotor.
- After installing the rotor, check that the rotor rotates smoothly. If not, reinstall the key and rotor.



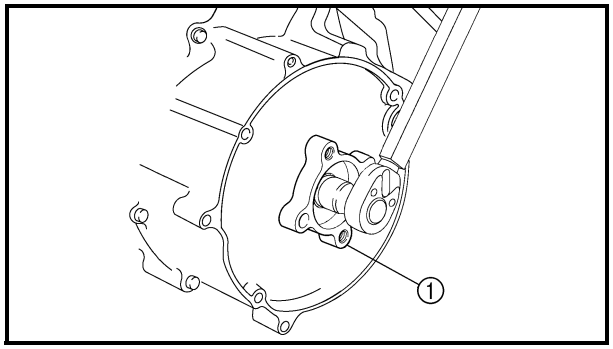
3. Install:
   - dowel pins
   - gasket New
   - A.C. magneto cover

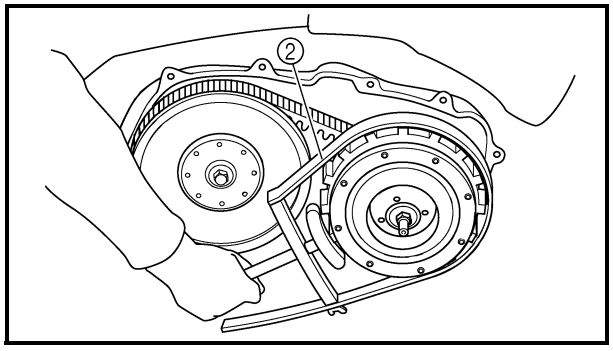
10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:

- When installing the A.C. magneto cover, use a long rod to hold the A.C. magneto rotor in position from the outside. This will make assembly easier. Be careful not to damage the oil seal.
- Apply sealant (Quick Gasket®) ① to the thread of the bolt ② shown in the illustration.
- Tighten the bolts in stages, using a criss-cross pattern.

Sealant (Quick Gasket®)
P/N. ACC-11001-05-01
Yamaha bond No. 1215
P/N. 90890-85505





4. Install:
   - engine cooling fan pulley ①

55 Nm (5.5 m · kg, 40 ft · lb)

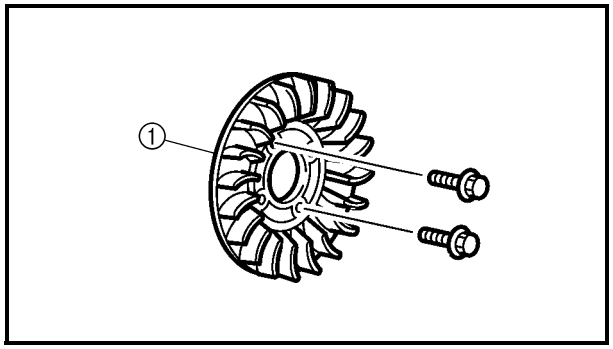
NOTE:

Use a sheave holder ② to hold the primary sheave.

Primary sheave holder
P/N. YS-01880-A
Sheave holder
P/N. 90890-01701

NOTE:

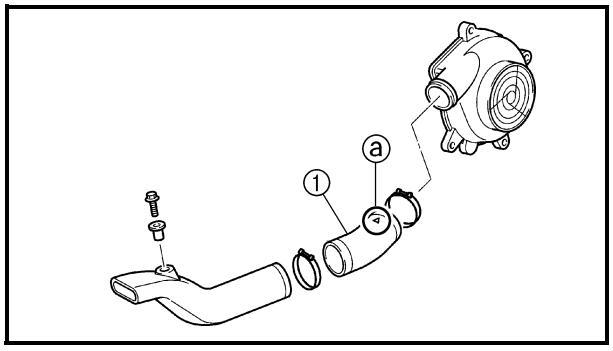
Before installing the engine cooling fan pulley, do not forget to install the O-ring.



5. Connect:
   - A.C. magneto couplers
6. Install:
   - engine cooling fan ①

7 Nm (0.7 m · kg, 5.1 ft · lb)

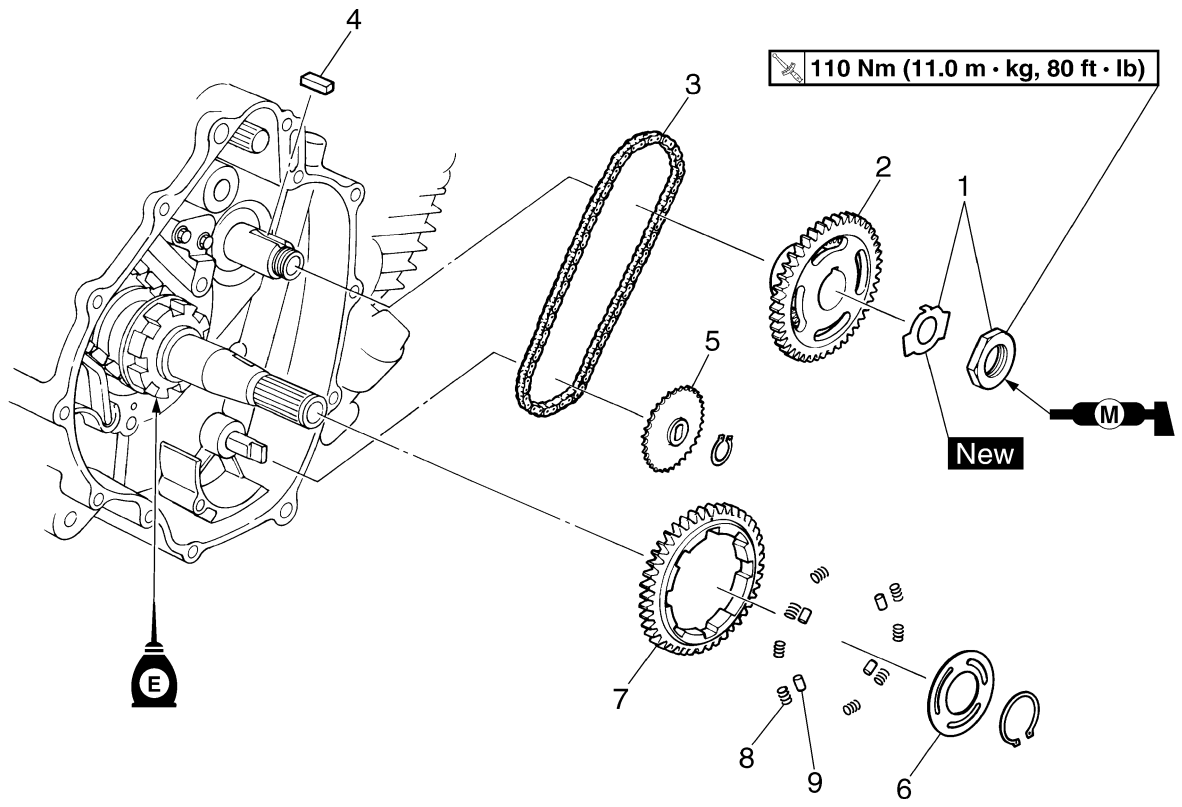
NOTE:
Install the bolts in the holes in the collar of the engine cooling fan.



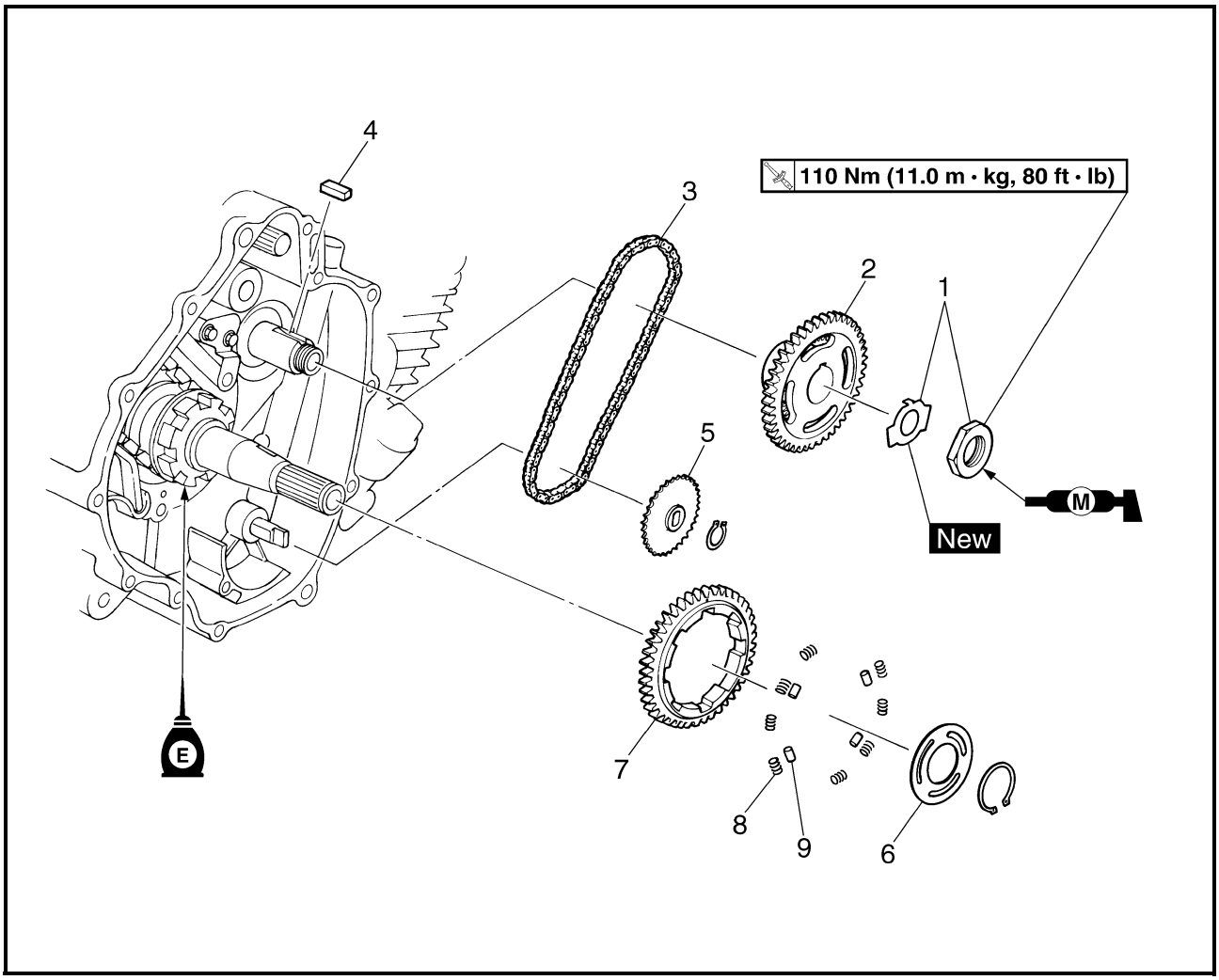
7. Install:
   - air shroud 1 **10 Nm (1.0 m · kg, 7.2 ft · lb)**
   - engine cooling fan air duct assembly ①

NOTE:
Install the engine cooling fan air duct assembly with the arrow mark ⓐ towards the air shroud 1.

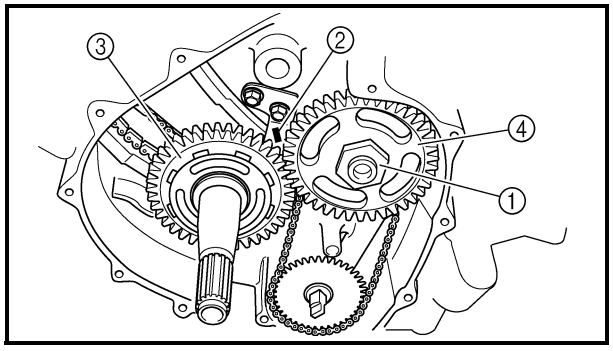
BALANCER GEARS AND OIL PUMP GEARS



Order	Job/Part	Q'ty	Remarks
	Removing the balancer gears and oil pump gears		Remove the parts in the order listed.
	Starter wheel gear		Refer to "ENGINE COOLING FAN AND A.C. MAGNETO".
1	Nut/lock washer	1/1	
2	Balancer driven/oil pump drive gear	1	Refer to "REMOVING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR" and "INSTALLING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR".
3	Chain	1	
4	Straight key	1	
5	Oil pump driven gear	1	
6	Plate	1	
7	Balancer drive gear	1	
8	Spring	8	



Order	Job/Part	Q'ty	Remarks
9	Pin	4	For installation, reverse the removal procedure.

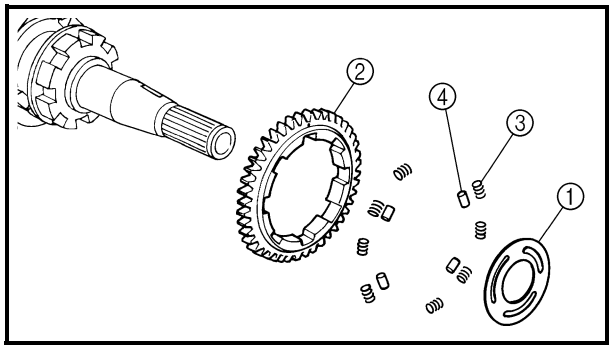


REMOVING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR

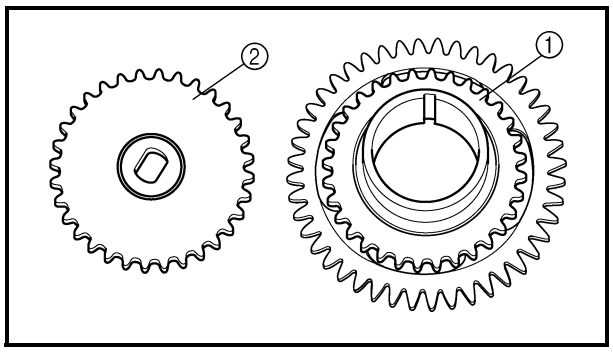
1. Straighten the lock washer tabs.
2. Loosen:
   - balancer driven gear nut ①

NOTE:

Place an aluminum plate ② between the teeth of the balancer drive gear ③ and balancer driven gear ④.

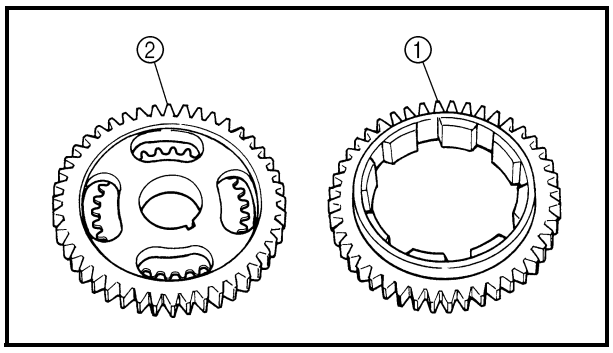


3. Remove:
   - circlip
   - plate ①
   - balancer drive gear ②
   - springs ③
   - pins ④



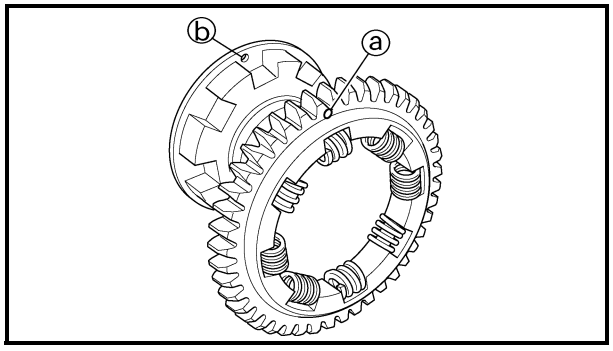
CHECKING THE OIL PUMP DRIVE GEAR AND OIL PUMP DRIVEN GEAR

1. Check:
   - oil pump drive gear ①
   - oil pump driven gear ②
     Cracks/wear/damage → Replace.



CHECKING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR

1. Check:
   - balancer drive gear ①
   - balancer driven gear ②
     Damage/wear → Replace the balancer drive gear and balancer driven gear as a set.
     Excessive noise during operation → Replace the balancer drive gear and balancer driven gear as a set.

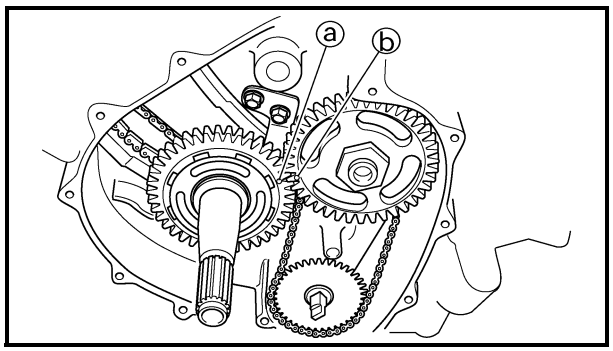


INSTALLING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR

1. Install:
   - pins
   - springs
   - balancer drive gear (onto the buffer boss)
   - plate
   - circlip

NOTE:

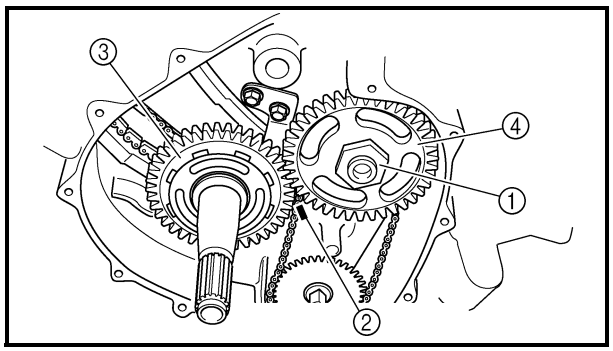
Align the punch mark ⓐ on the balancer drive gear with the hole ⓑ to the buffer boss.



2. Install:
   - balancer driven gear

NOTE:

Align the punch mark ⓐ on the balancer drive gear with the punch mark ⓑ on the balancer driven gear.



3. Install:
   - lock washer New
   - balancer driven gear nut ①

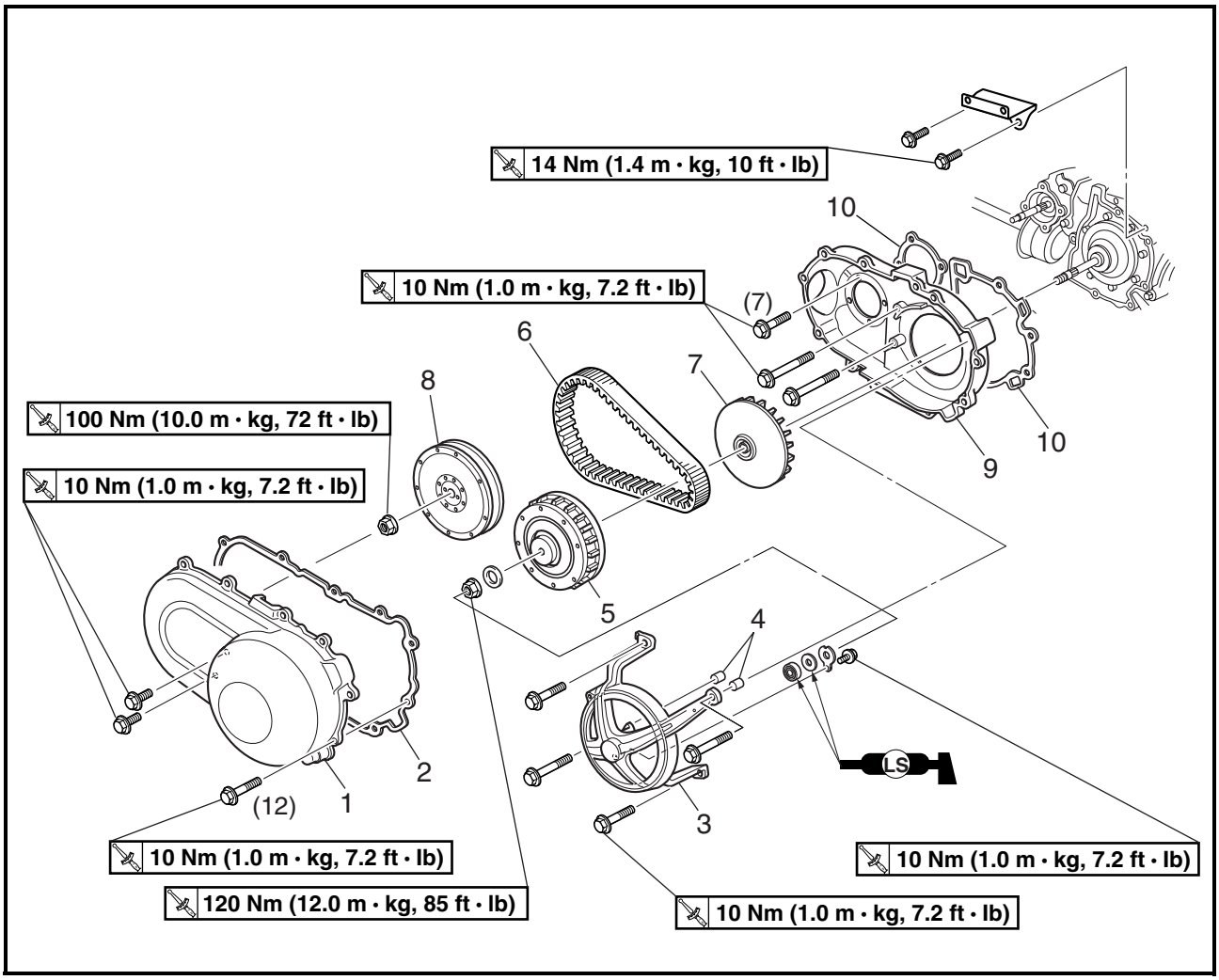
110 Nm (11.0 m · kg, 80 ft · lb)

NOTE:

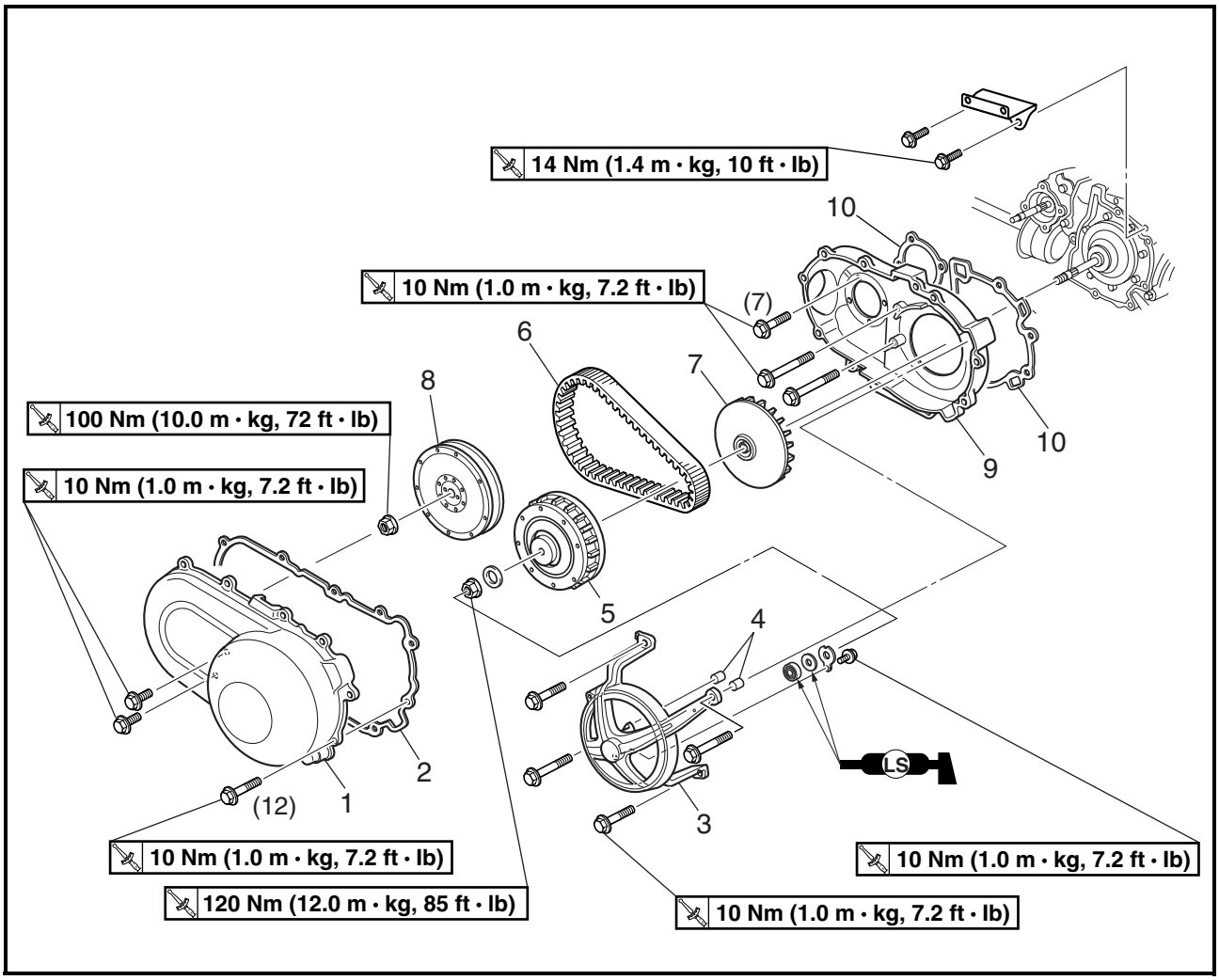
- Place an aluminum plate ② between the teeth of the balancer drive gear ③ and balancer driven gear ④.
- Apply the molybdenum disulfide grease to the thread of axle and nut.

4. Bend the lock washer tabs along the balancer driven gear nut.

PRIMARY AND SECONDARY SHEAVES

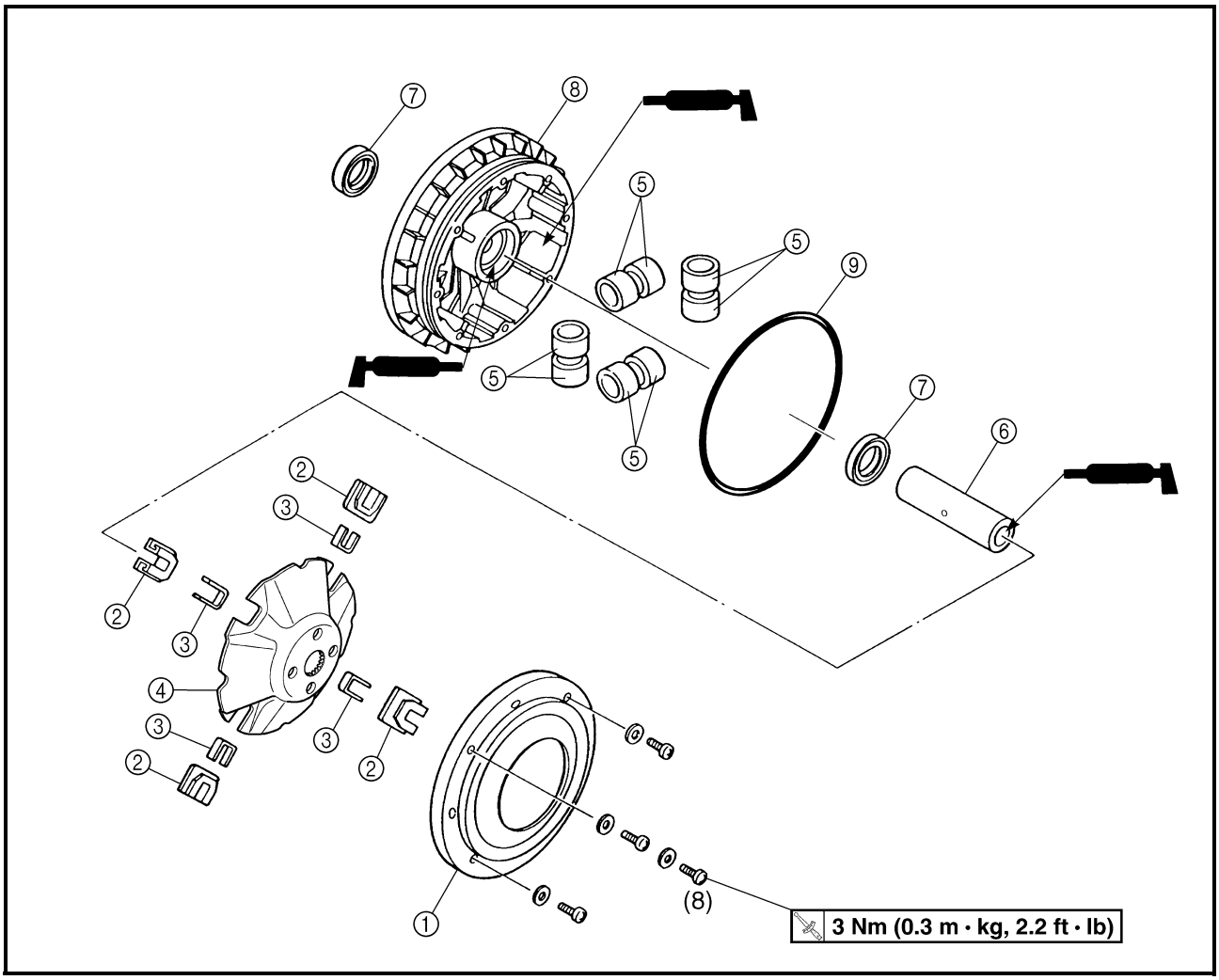

14 Nm (1.4 m · kg, 10 ft · lb)
10
10 Nm (1.0 m · kg, 7.2 ft · lb)
(7)
6
7
8
100 Nm (10.0 m · kg, 72 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
9
10
5
4
LS
2
(12)
1
3
10 Nm (1.0 m · kg, 7.2 ft · lb)
120 Nm (12.0 m · kg, 85 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)

Order	Job/Part	Q'ty	Remarks
	Removing the primary and secondary sheaves		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
1	Drive belt cover	1	
2	Rubber gasket	1	
3	Bearing housing	1	
4	Dowel pin	2	
5	Primary sheave assembly	1	Refer to "REMOVING THE PRIMARY AND SECONDARY SHEAVES" and "INSTALLING THE PRIMARY AND SECONDARY SHEAVES".
6	V-belt	1	**NOTE:** The V-belt can be replaced even if the engine assembly is not removed.


14 Nm (1.4 m · kg, 10 ft · lb)
10
10 Nm (1.0 m · kg, 7.2 ft · lb)
(7)
6
7
8
100 Nm (10.0 m · kg, 72 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
9
10
5
4
LS
2
(12)
1
3
10 Nm (1.0 m · kg, 7.2 ft · lb)
120 Nm (12.0 m · kg, 85 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)

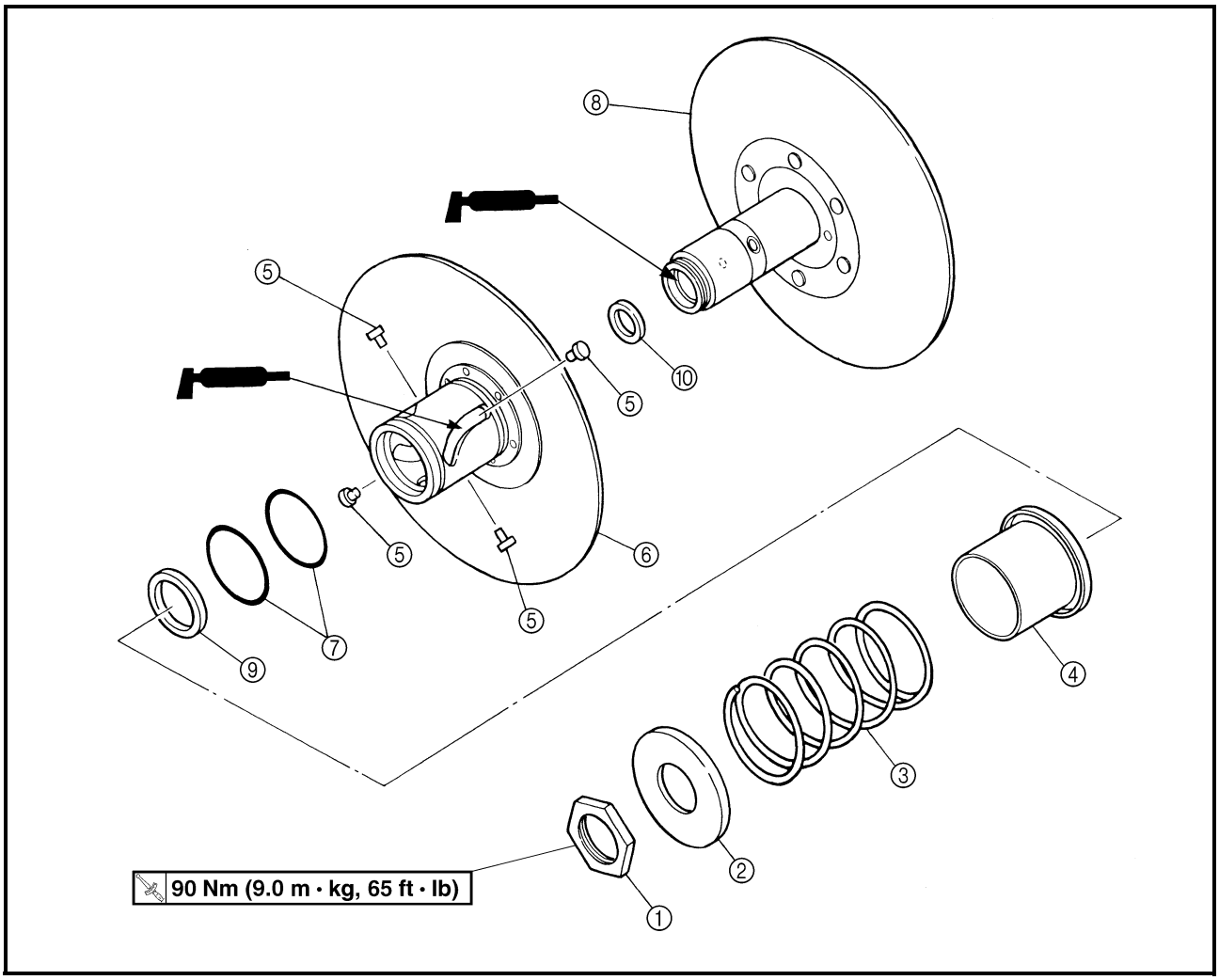
Order	Job/Part	Q'ty	Remarks
7	Primary fixed sheave	1	Refer to "REMOVING THE PRIMARY AND SECONDARY SHEAVES" and "INSTALLING THE PRIMARY AND SECONDARY SHEAVES".
8	Secondary sheave assembly	1	
9	Drive belt case	1	
10	Rubber gasket	2	
			For installation, reverse the removal procedure.

PRIMARY SHEAVE

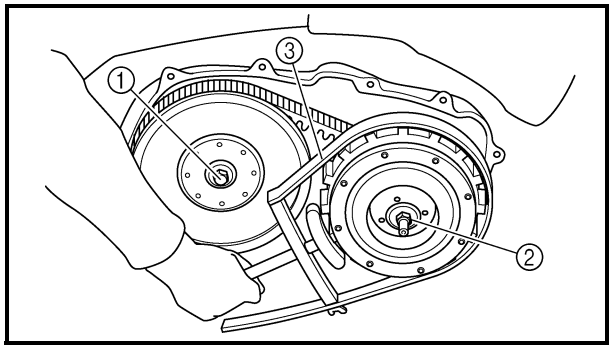


Order	Job/Part	Q'ty	Remarks
	Disassembling the primary sheave		Remove the parts in the order listed.
①	Primary pulley sheave cap	1	
②	Primary pulley slider	4	
③	Spacer	4	
④	Primary pulley cam	1	
⑤	Primary pulley weight	8	Refer to "ASSEMBLING THE PRIMARY SHEAVE".
⑥	Collar	1	
⑦	Oil seal	2	
⑧	Primary sliding sheave	1	
⑨	O-ring	1	
			For assembly, reverse the disassembly procedure.

SECONDARY SHEAVE



Order	Job/Part	Q'ty	Remarks
	Disassembling the secondary sheave		Remove the parts in the order listed.
①	Nut	1	Refer to "DISASSEMBLING THE SECONDARY SHEAVE" and "ASSEMBLING THE SECONDARY SHEAVE".
②	Spring seat	1	
③	Compression spring	1	
④	Spring seat	1	
⑤	Guide pin	4	
⑥	Secondary sliding sheave	1	
⑦	O-ring	2	
⑧	Secondary fixed sheave	1	
⑨	Oil seal	1	
⑩	Oil seal	1	
			For assembly, reverse the disassembly procedure.



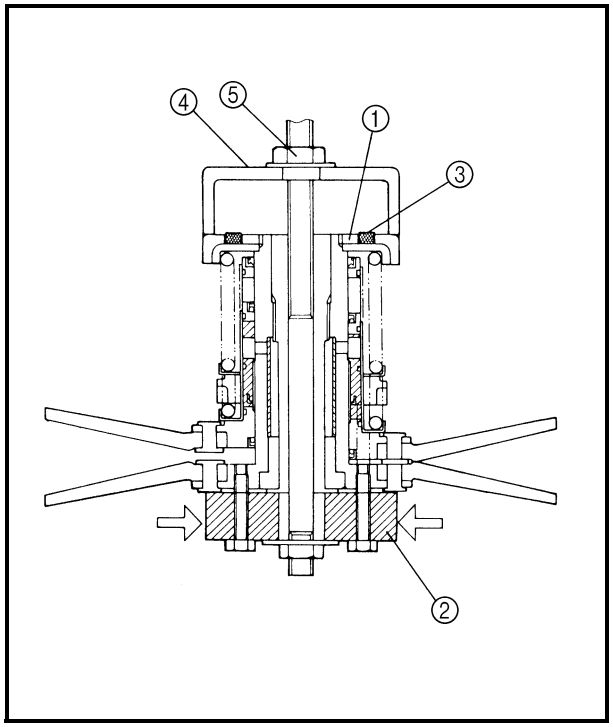
REMOVING THE PRIMARY AND SECONDARY SHEAVES

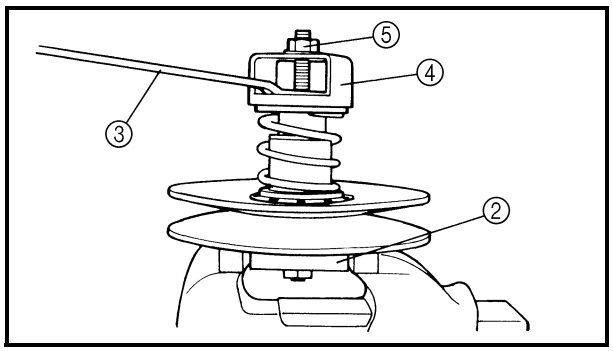
1. Loosen:
   - secondary sheave nut ①
   - primary sheave nut ②

NOTE:

- Use the sheave holder ③ to hold the primary sheave.
- First, loosen the secondary sheave nut ①, then loosen the primary sheave nut ②.

Primary sheave holder
P/N. YS-01880-A
Sheave holder
P/N. 90890-01701





DISASSEMBLING THE SECONDARY SHEAVE

1. Remove:
   - nut ①

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Attach the sheave fixed block ②, locknut wrench ③ and sheave spring compressor ④ to the secondary sheave assembly.

Sheave fixed block
P/N. YM-04135, 90890-04135
Locknut wrench
P/N. YM-01348, 90890-01348
Sheave spring compressor
P/N. YM-04134, 90890-04134

b. Place the sheave fixed block in a vise and secure it.
c. Tighten the sheave spring compressor nut ⑤ and compress the spring.
d. Loosen the nut ① with the locknut wrench ③.
e. Remove the nut ①.
f. Remove the sheave spring compressor and locknut wrench.

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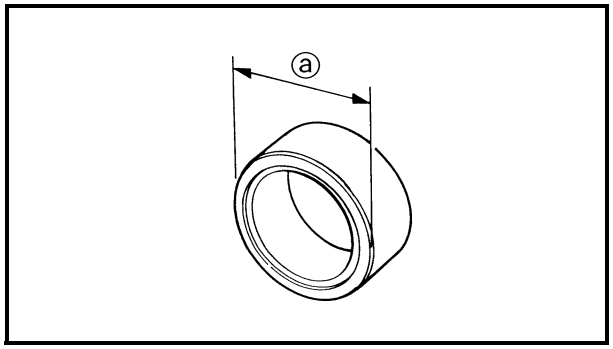
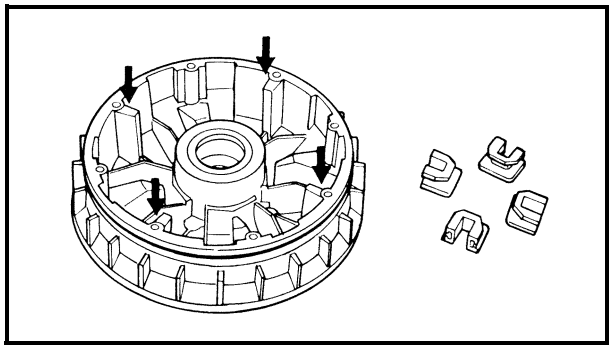


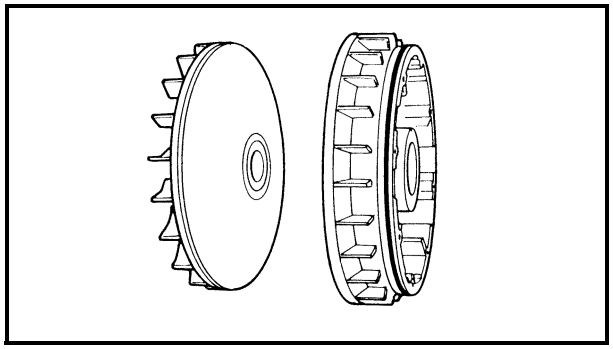
CHECKING THE PRIMARY SHEAVE

1. Check:
   - weight outside diameter ⓐ
     Out of specification → Replace the weight.

Weight outside diameter
30 mm (1.18 in)
<Limit>: 29.5 mm (1.16 in)



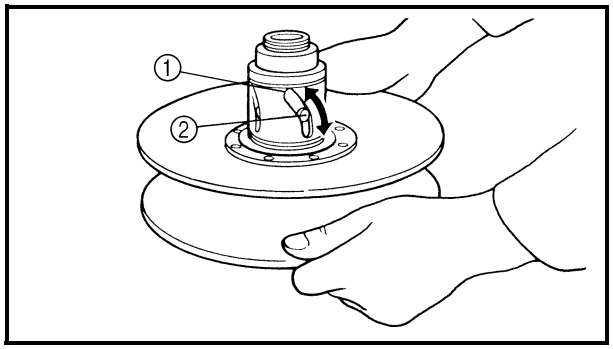
2. Check:
   - primary pulley slider
   - primary sliding sheave splines
     Wear/cracks/damage → Replace.
   - spacer
   - primary pulley cam
     Cracks/damage → Replace.

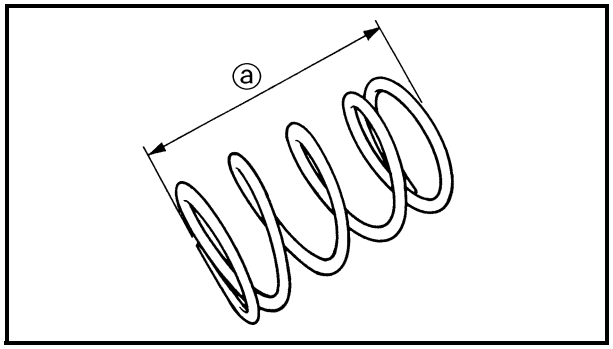


3. Check:
   - primary sliding sheave
   - primary fixed sheave
     Cracks/damage → Replace.

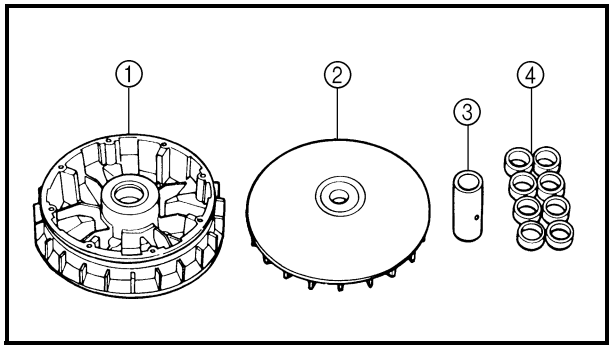
CHECKING THE SECONDARY SHEAVE

1. Check:
   - secondary fixed sheave smooth operation
   - secondary sliding sheave smooth operation
     Scratches/damage → Replace as a set.
2. Check:
   - torque cam grooves ①
     Wear/damage → Replace.
3. Check:
   - guide pins ②
     Wear/damage → Replace.
4. Check:
   - secondary sheave spring
     Damage → Replace.
5. Measure:
   - secondary sheave spring free length ⓐ
     Out of specification → Replace the secondary sheave spring.





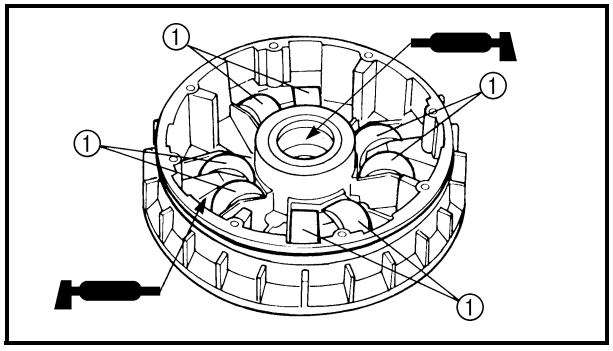
Free length
124.2 mm (4.89 in)
<Limit>: 112.0 mm (4.40 in)



ASSEMBLING THE PRIMARY SHEAVE

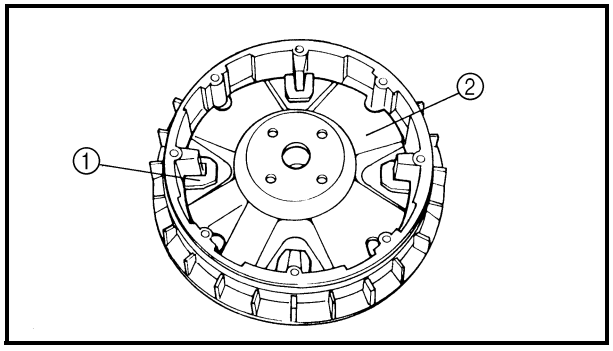
1. Clean:
   - primary sliding sheave face ①
   - primary fixed sheave face ②
   - collar ③
   - weights ④
   - primary sliding sheave cam face

NOTE:
Remove any excess grease.



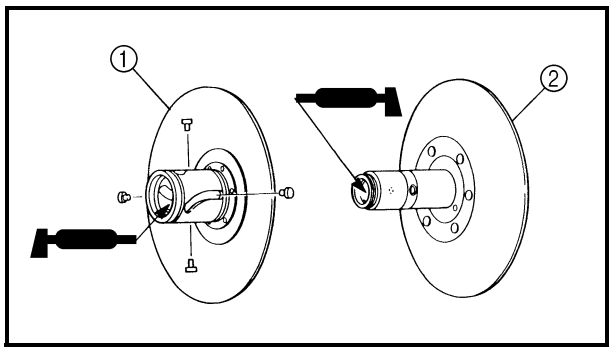
2. Install:
   - weights ①

NOTE:
- Apply Yamaha Grizzly grease (90 g) to the whole outer surface of the weights and install.
- Apply Yamaha Grizzly grease to the inner surface of the collar.
- Apply Yamaha Grizzly grease to the inner surface of the primary sliding sheave.



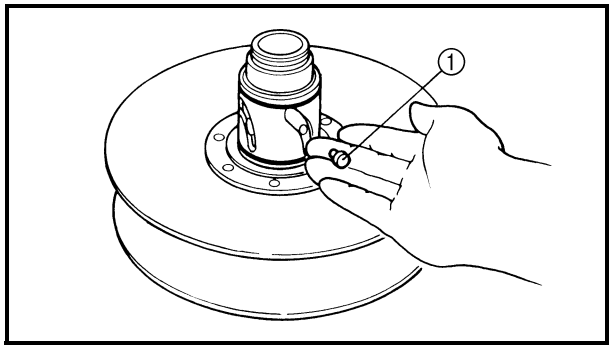
3. Install:
   - spacer
   - sliders ①
   - primary pulley cam ②
   - primary sliding sheave cap

	3 Nm (0.3 m · kg, 2.2 ft · lb)

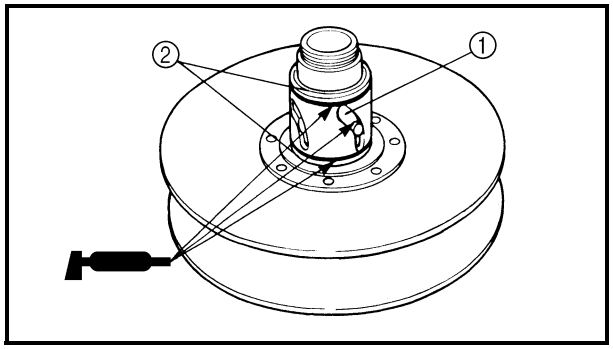


ASSEMBLING THE SECONDARY SHEAVE

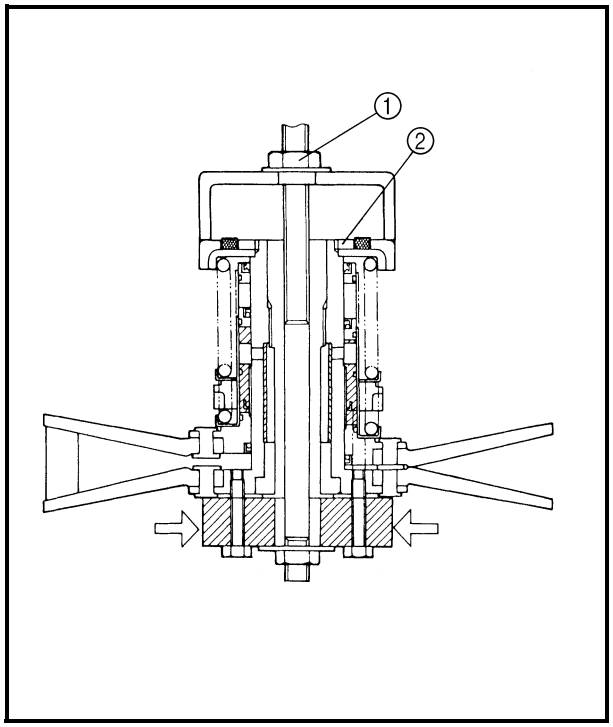
1. Apply:
   - BEL-RAY assembly lube®
     (to the secondary sliding sheave ① inner surface and oil seals)
   - BEL-RAY assembly lube®
     (to the bearings, oil seals and inner surface of the secondary fixed sheave ②)



2. Install:
   - guide pins ①



3. Apply:
   • BEL-RAY assembly lube®
   (to the guide pin sliding grooves ①, and O-rings ② New)



4. Install:
   • spring seat
   • compression spring
   • spring seat
   • nut

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a. Attach the sheave fixed block, locknut wrench and sheave spring compressor to the secondary sheave assembly.

Sheave fixed block
P/N. YM-04135, 90890-04135
Locknut wrench
P/N. YM-01348, 90890-01348
Sheave spring compressor
P/N. YM-04134, 90890-04134

b. Place the sheave fixed block in a vise and secure it.
c. Tighten the sheave spring compressor nut ① and compress the spring.
d. Install the nut ② and tighten it to the specified torque using the locknut wrench.

Nut
90 Nm (9.0 m · kg, 65 ft · lb)

e. Remove the sheave spring compressor, locknut wrench, and sheave fixed block.

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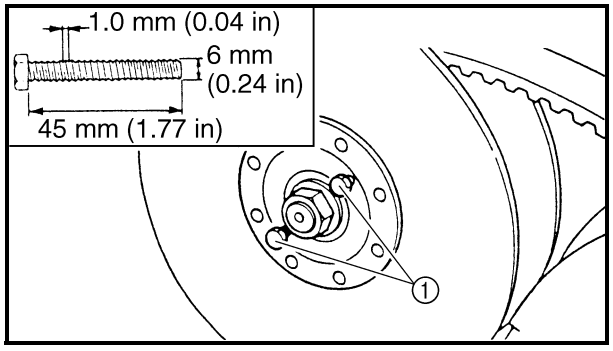
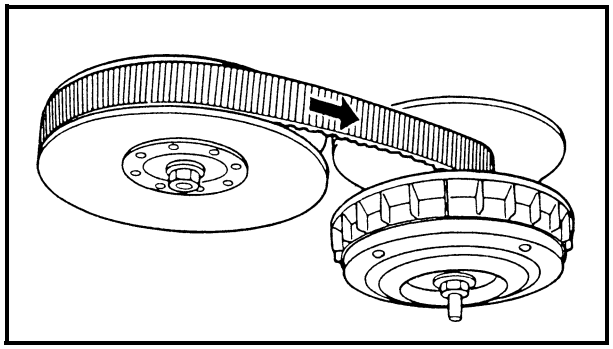
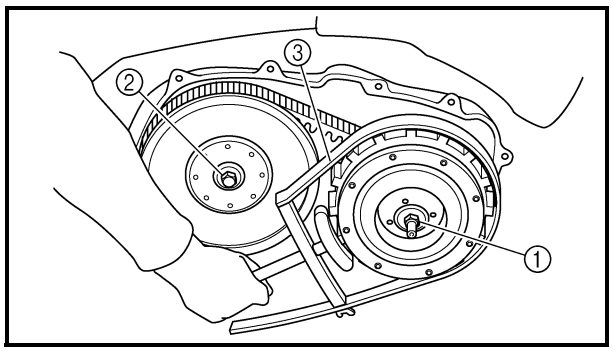






INSTALLING THE PRIMARY AND SECONDARY SHEAVES

1. Install:
   - secondary sheave assembly
   - V-belt
   - primary sheave assembly

NOTE:

- Tightening the bolts ① will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.
- Install the V-belt so that its arrow faces the direction show in the illustration.

2. Tighten:
   - primary sheave nut ①

120 Nm (12.0 m · kg, 85 ft · lb)

   - secondary sheave nut ②

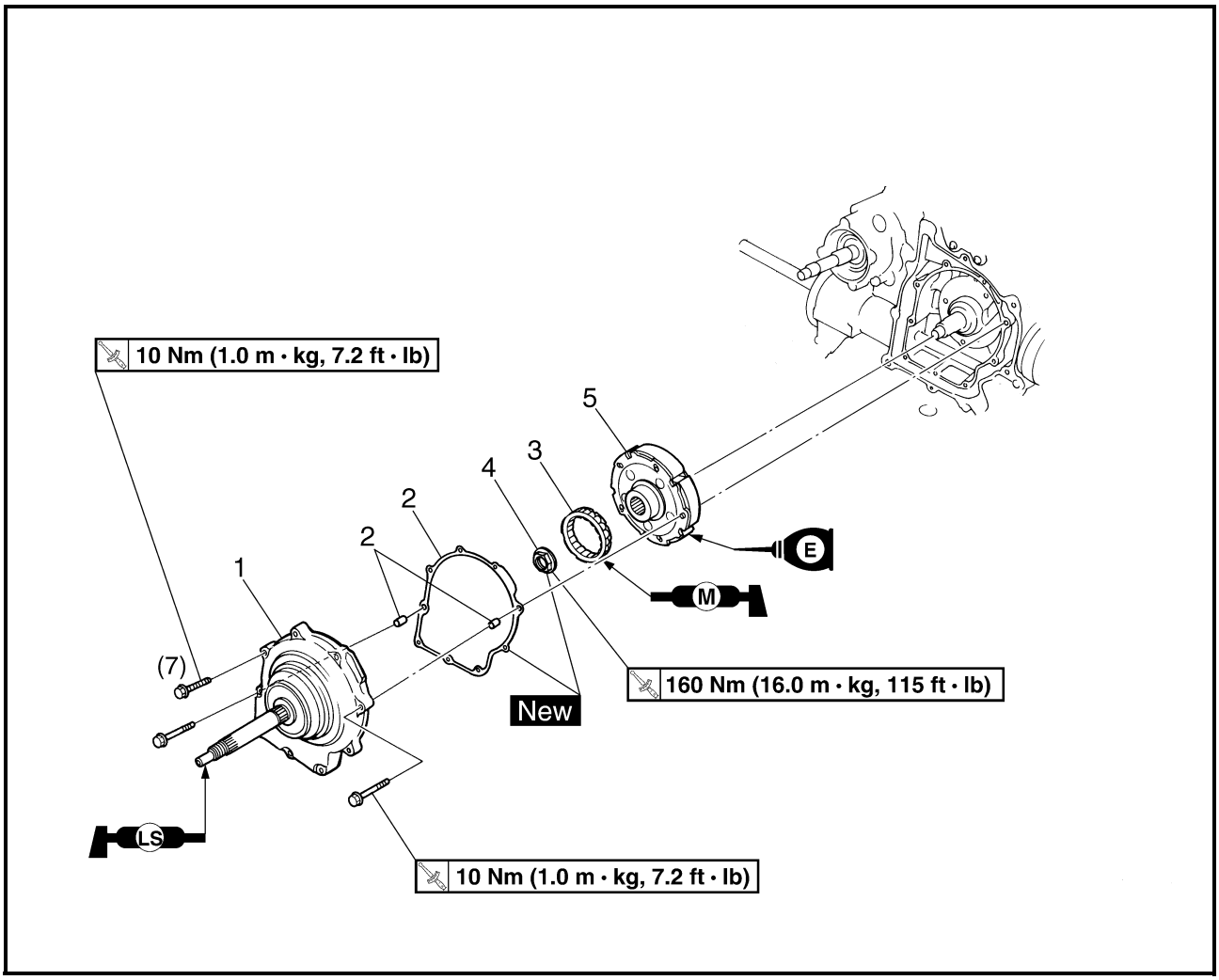
100 Nm (10.0 m · kg, 72 ft · lb)

NOTE:

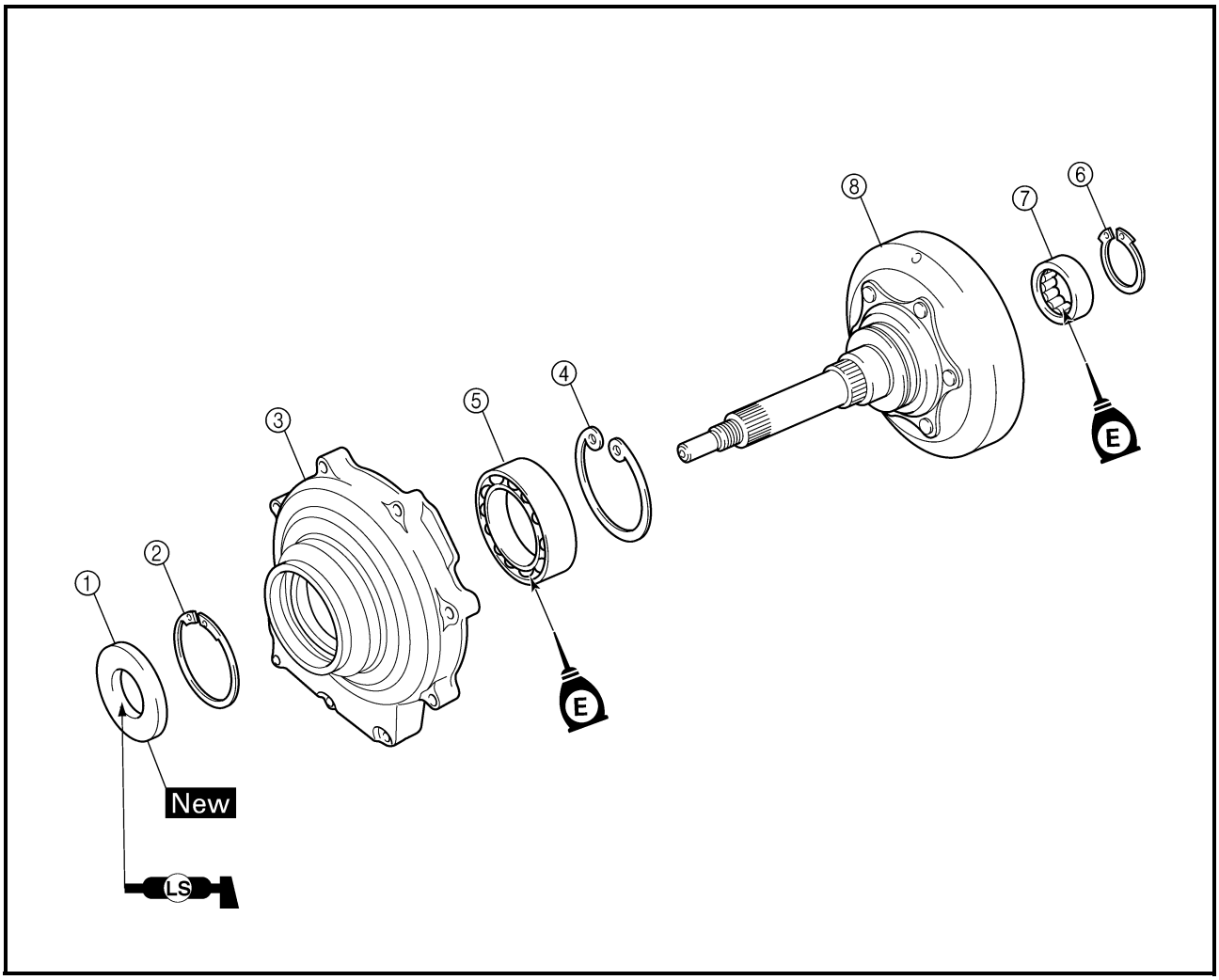
- Use the sheave holder ③ to hold the primary sheave.
- First, tighten the primary sheave nut ①, then tighten the secondary sheave nut ②.

Primary sheave holder
P/N. YS-01880-A
Sheave holder
P/N. 90890-01701

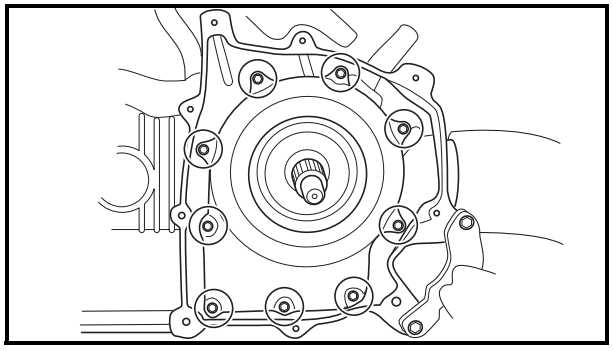
CLUTCH



Order	Job/Part	Q'ty	Remarks
	Removing the clutch		Remove the parts in the order listed.
	Primary and secondary sheaves		Refer to "PRIMARY AND SECONDARY SHEAVES".
1	Clutch housing assembly	1	
2	Gasket/dowel pin	1/2	Refer to "REMOVING THE CLUTCH" and "INSTALLING THE CLUTCH".
3	One-way clutch bearing	1	
4	Nut	1	
5	Clutch carrier assembly	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the clutch housing		Remove the parts in the order listed.
①	Oil seal	1	
②	Circlip	1	
③	Bearing housing	1	
④	Circlip	1	
⑤	Bearing	1	
⑥	Circlip	1	
⑦	Bearing	1	
⑧	Clutch housing	1	
			For assembly, reverse the disassembly procedure.

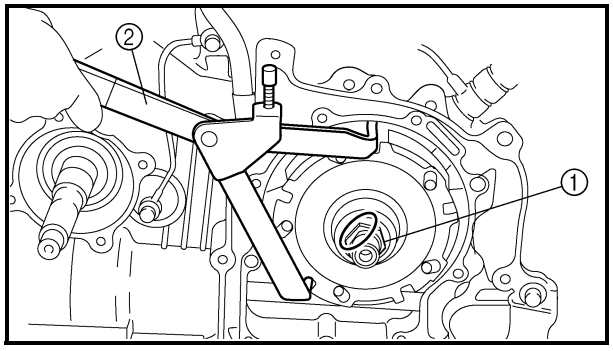


REMOVING THE CLUTCH

1. Remove:
   - clutch housing assembly
   - gasket
   - dowel pins

NOTE:

Working in crisscross pattern, loosen each bolt 1/4 of a turn. Remove them after all of them are loosened.

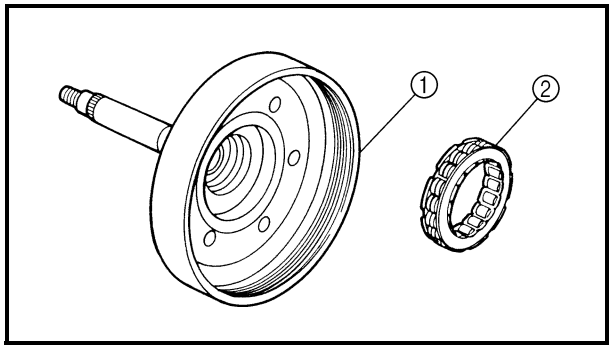


2. Straighten:
   - punched portion of the nut ①
3. Remove:
   - nut ①

NOTE:

Use a universal clutch holder ② to hold the clutch carrier assembly.

	Universal clutch holder **P/N. YM-91042, 90890-04086**



CHECKING THE CLUTCH

1. Check:
   - clutch housing ①
     Heat damage/wear/damage → Replace.
   - one-way clutch bearing ②
     Chafing/wear/damage → Replace.

NOTE:

- Replace the one-way clutch assembly and clutch housing as a set.
- The one-way clutch bearing must be installed with the flange side facing in.

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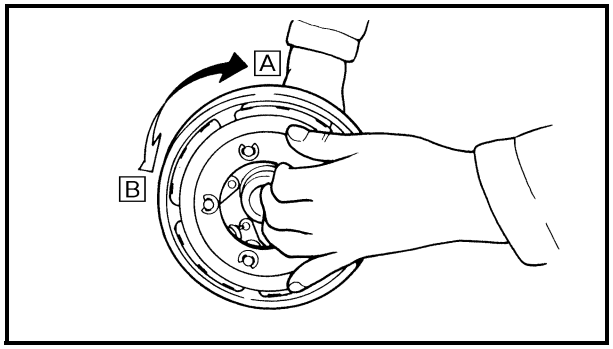
a. Install the one-way clutch bearing and clutch carrier assembly to the clutch housing and hold the clutch carrier assembly.



b. When turning the clutch housing clockwise [A], the clutch housing should turn freely.
   If not, the one-way clutch assembly is faulty.
   Replace it.
c. When turning the clutch housing counterclockwise [B], the clutch housing and crankshaft should be engaged.
   If not, the one-way clutch assembly is faulty.
   Replace it.

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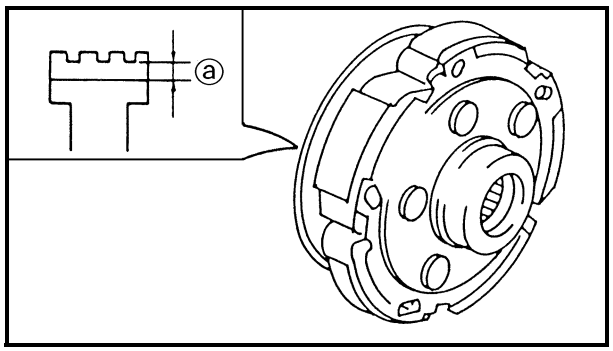
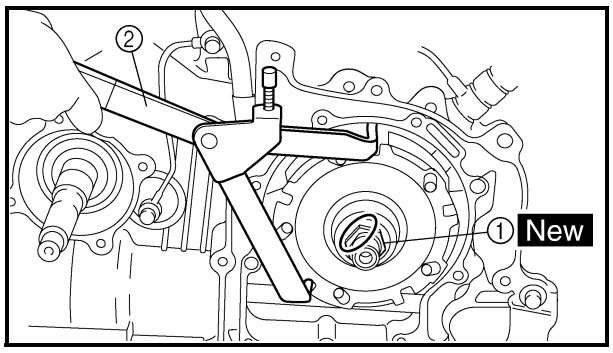
2. Check:
   • clutch shoe
   Heat damage → Replace.



3. Measure:
   • clutch shoe thickness
   Out of specification → Replace.

Clutch shoe thickness
1.5 mm (0.06 in)
Clutch shoe wear limit ⓐ
1.0 mm (0.04 in)



INSTALLING THE CLUTCH

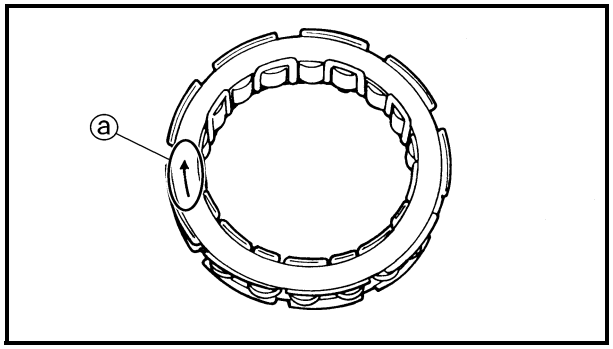
1. Install:
   • clutch carrier assembly
   • nut ① New

160 Nm (16.0 m · kg, 115 ft · lb)

NOTE:
Use a universal clutch holder ② to hold the clutch carrier assembly.

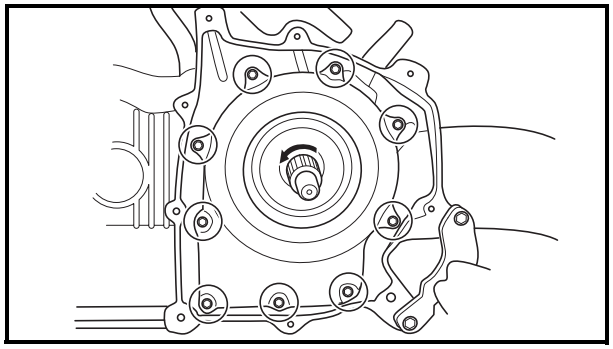
Universal clutch holder
P/N. YM-91042, 90890-04086

2. Lock the threads with a drift punch.



3. Install:
   • one-way clutch bearing

NOTE:
The one-way clutch bearing should be installed in the clutch carrier assembly with the arrow mark ⓐ facing toward the clutch housing.



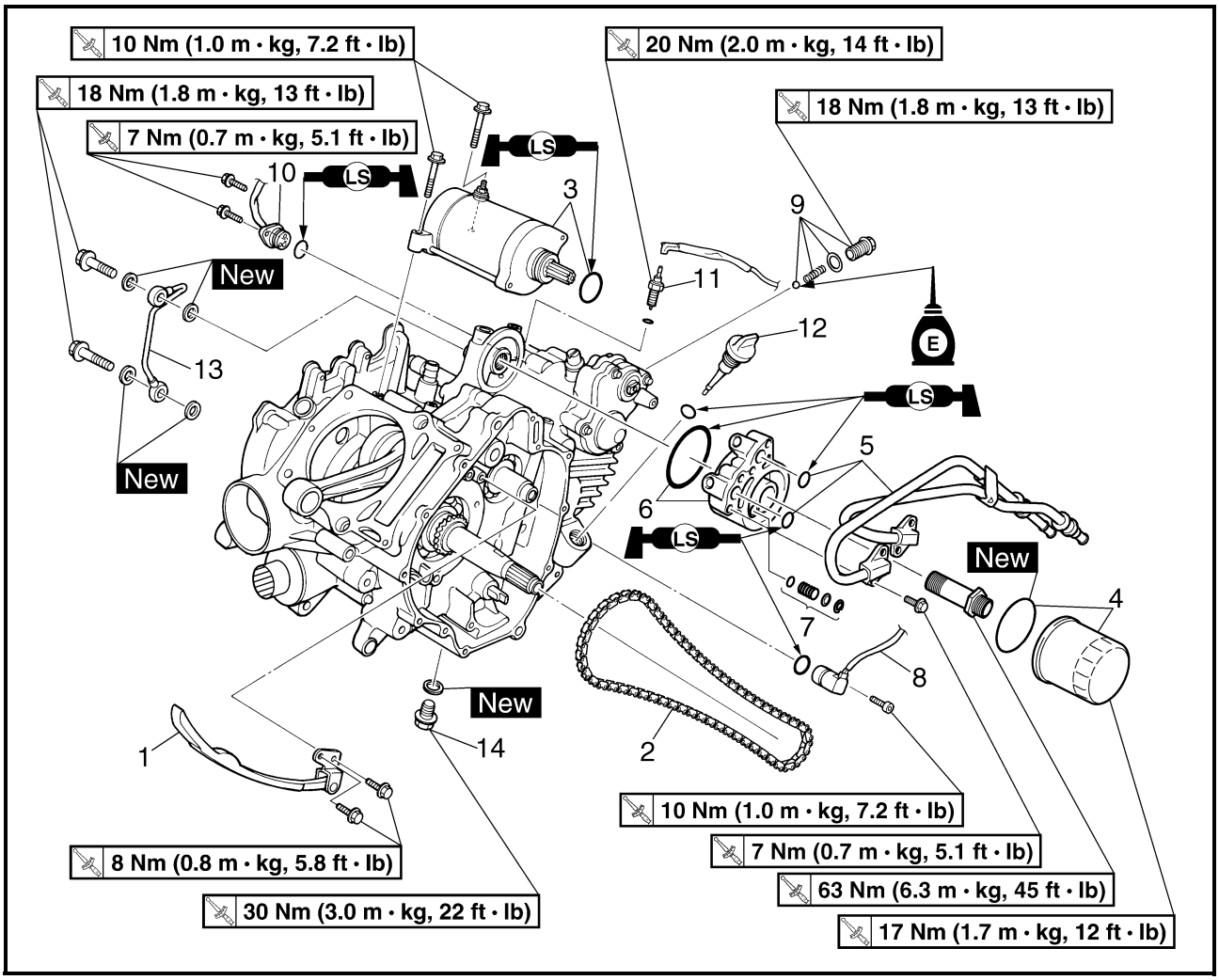
4. Install:
   • dowel pins
   • gasket New
   • clutch housing assembly

10 Nm (1.0 m · kg, 7.2 ft · lb)

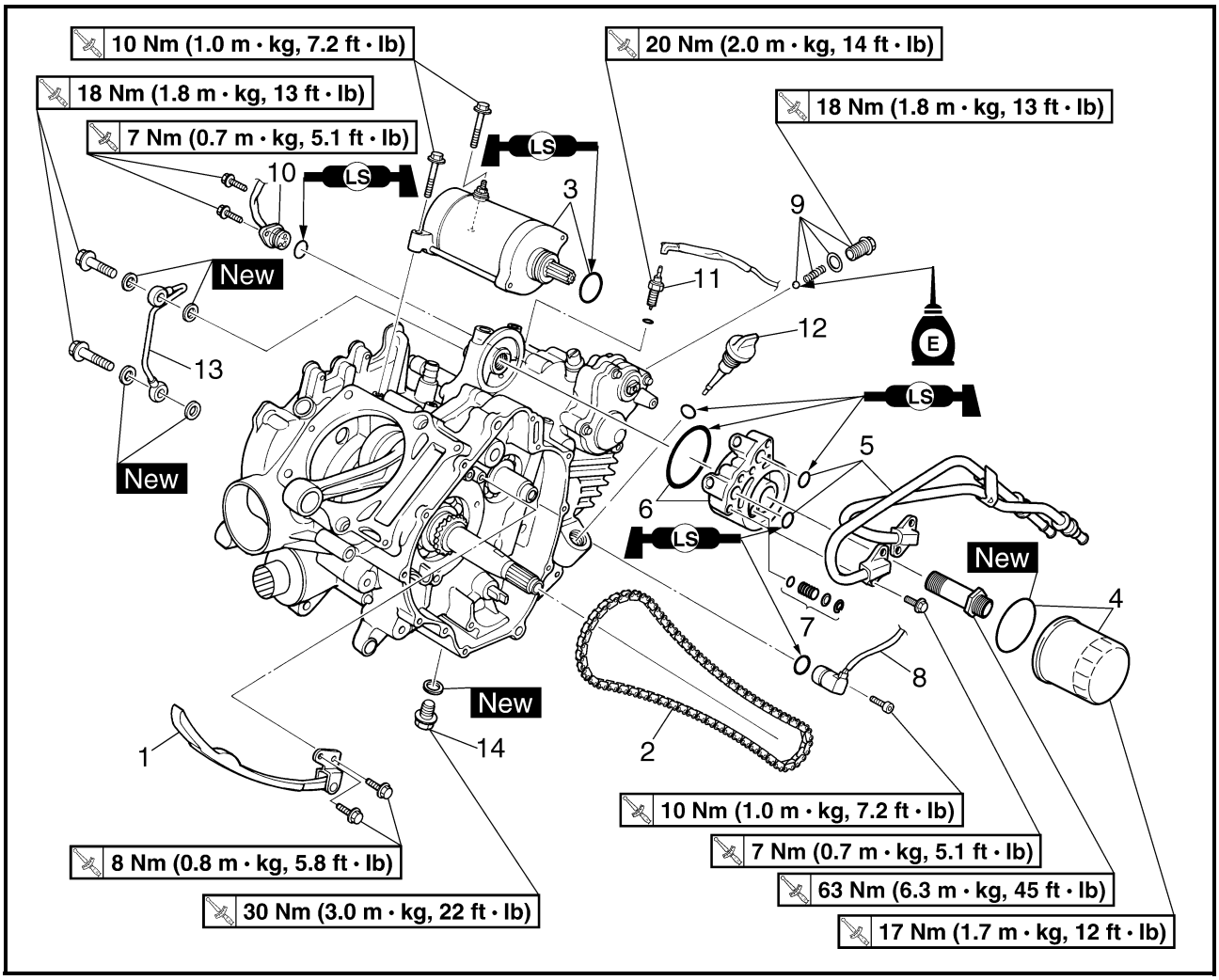
NOTE:
- Tighten the bolts in stages, using a criss-cross pattern.
- After tightening the bolts, check that the clutch housing assembly to counterclockwise rotates smoothly.

CRANKCASE

STARTER MOTOR, TIMING CHAIN AND OIL FILTER

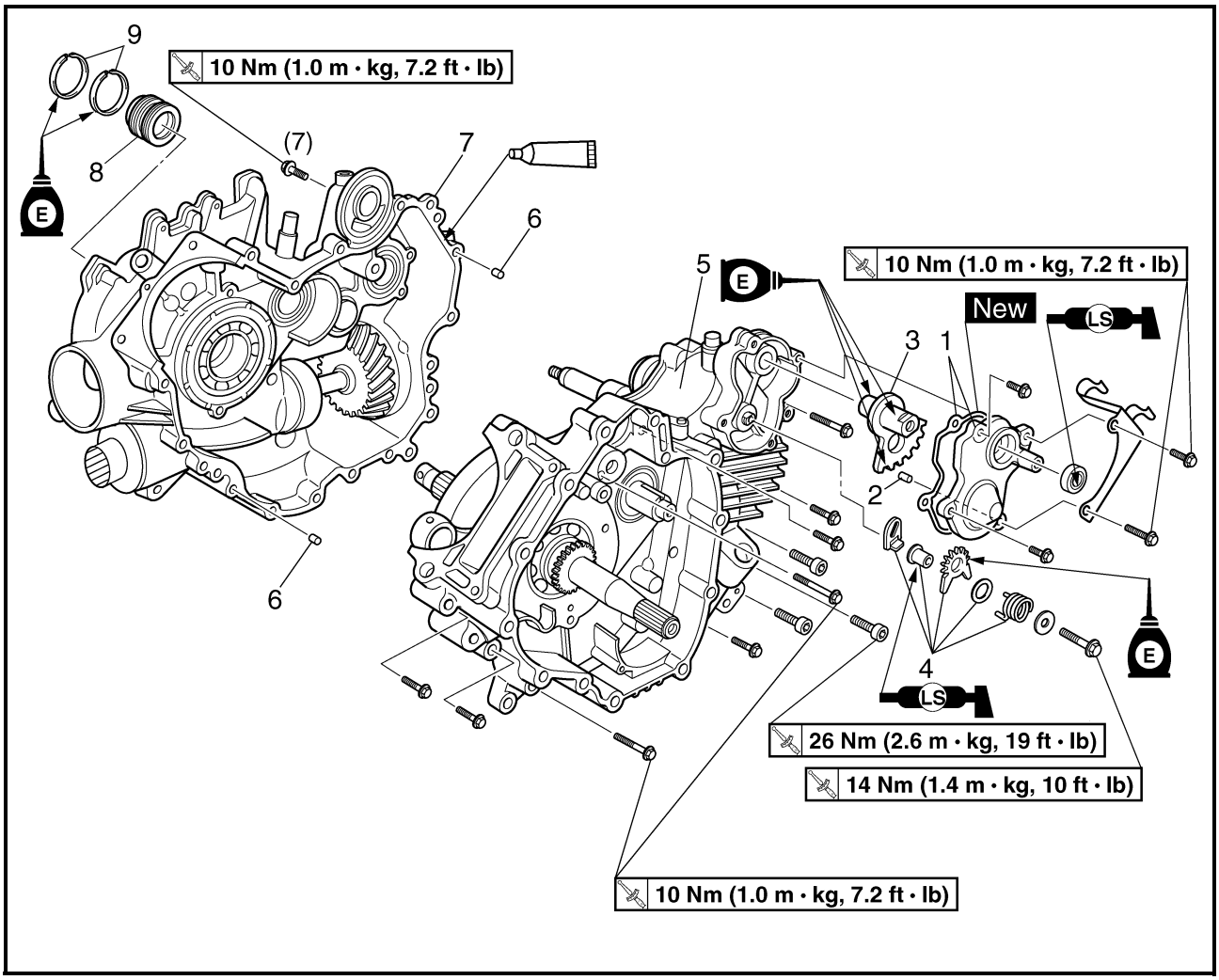

10 Nm (1.0 m · kg, 7.2 ft · lb)
18 Nm (1.8 m · kg, 13 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
20 Nm (2.0 m · kg, 14 ft · lb)
18 Nm (1.8 m · kg, 13 ft · lb)
LS
E
New
8 Nm (0.8 m · kg, 5.8 ft · lb)
30 Nm (3.0 m · kg, 22 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
63 Nm (6.3 m · kg, 45 ft · lb)
17 Nm (1.7 m · kg, 12 ft · lb)
1
2
3
4
5
6
7
8
9
10
11
12
13
14

Order	Job/Part	Q'ty	Remarks
	Remove the starter motor, timing chain and oil filter		Remove the parts in the order listed.
	Engine assembly		Refer to "ENGINE REMOVAL".
	Cylinder head		Refer to "CAMSHAFT AND CYLINDER HEAD".
	Cylinder and piston		Refer to "CYLINDER AND PISTON".
	A.C. magneto rotor		Refer to "ENGINE COOLING FAN AND A.C. MAGNETO".
	Primary and secondary sheaves		Refer to "PRIMARY AND SECONDARY SHEAVES".
	Clutch carrier assembly		Refer to "CLUTCH".
1	Timing chain guide (intake side)	1	
2	Timing chain	1	
3	Starter motor/O-ring	1/1	
4	Oil filter cartridge/O-ring	1	


10 Nm (1.0 m · kg, 7.2 ft · lb)
18 Nm (1.8 m · kg, 13 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
20 Nm (2.0 m · kg, 14 ft · lb)
18 Nm (1.8 m · kg, 13 ft · lb)
LS
E
New
8 Nm (0.8 m · kg, 5.8 ft · lb)
30 Nm (3.0 m · kg, 22 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
7 Nm (0.7 m · kg, 5.1 ft · lb)
63 Nm (6.3 m · kg, 45 ft · lb)
17 Nm (1.7 m · kg, 12 ft · lb)
1
2
3
4
5
6
7
8
9
10
11
12
13
14

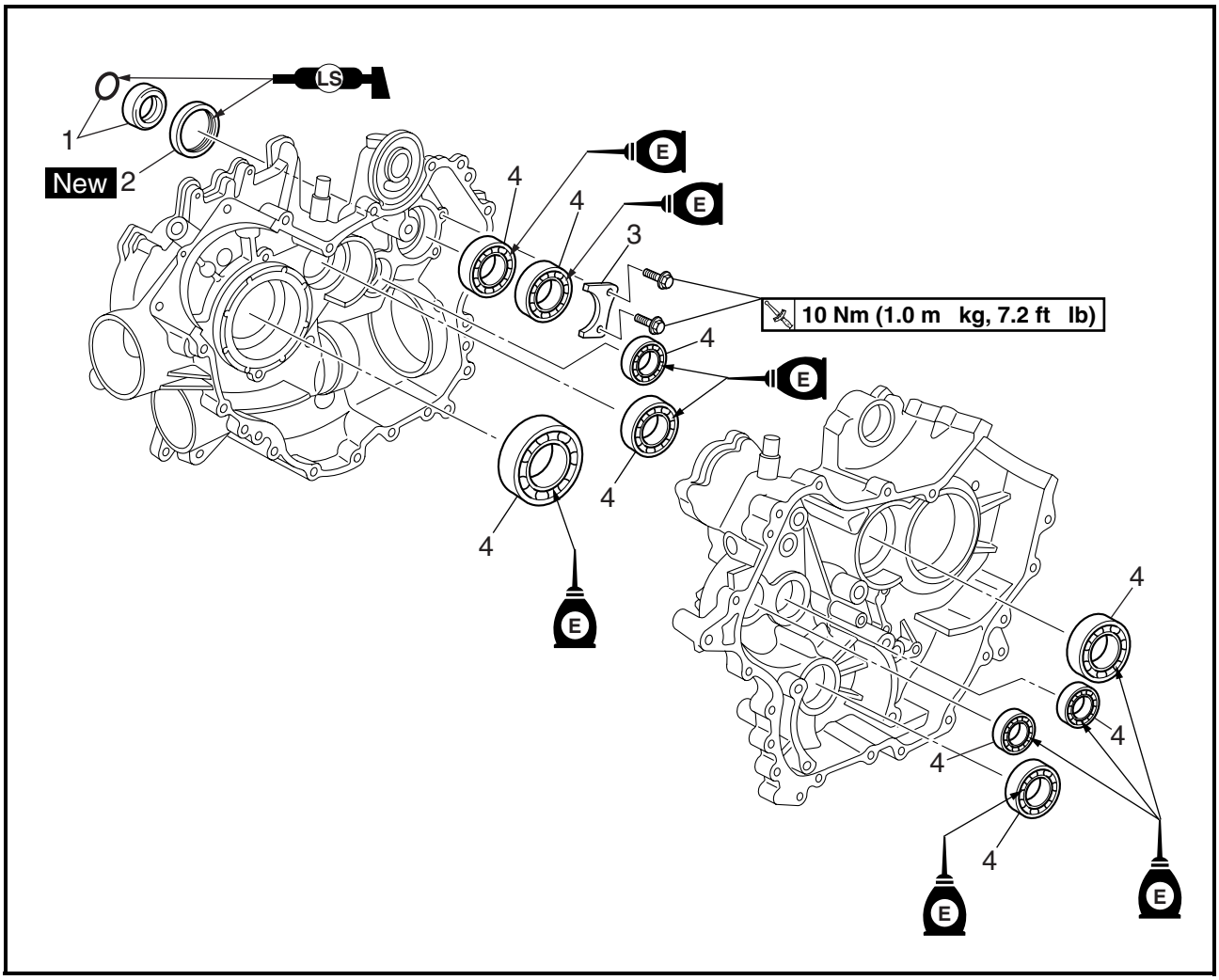
Order	Job/Part	Q'ty	Remarks
5	Oil pipe assembly/O-ring	1/2	
6	Oil pipe adapter/O-ring	1/1	
7	Relief valve assembly	1	
8	Speed sensor	1	
9	Shift drum stopper	1	
10	Gear position switch	1	
11	Reverse switch	1	
12	Oil filler cap	1	
13	Oil delivery pipe 1	1	
14	Drain plug	1	
			For installation, reverse the removal procedure.

CRANKCASE

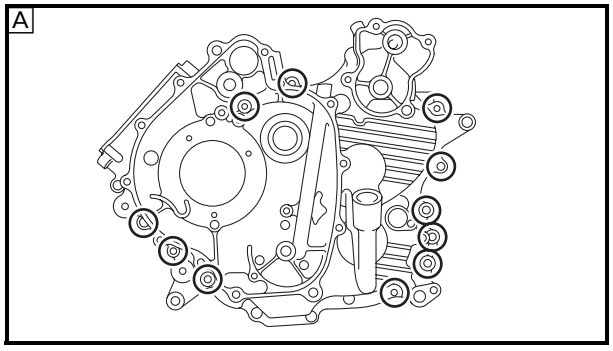


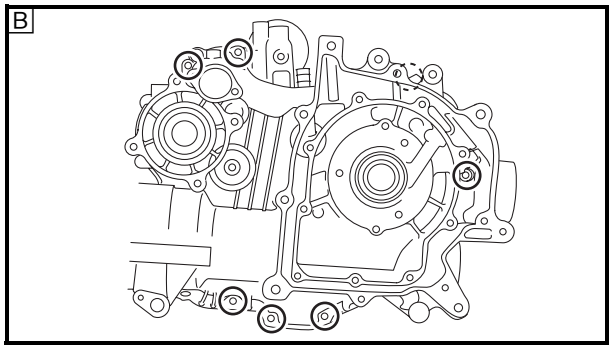
Order	Job/Part	Q'ty	Remarks
	Separating the crankcase		Remove the parts in the order listed.
1	Shift lever cover/gasket	1/1	
2	Dowel pin	1	Refer to "INSTALLING THE SHIFT LEVERS".
3	Shift lever 1	1	
4	Shift lever 2 assembly	1	
5	Right crankcase	1	Refer to "SEPARATING THE CRANKCASE" and "ASSEMBLING THE CRANKCASE".
6	Dowel pin	2	
7	Left crankcase	1	
8	Spacer	1	
9	Crankshaft seal	2	
			For installation, reverse the removal procedure.

CRANKCASE BEARINGS



Order	Job/Part	Q'ty	Remarks
	Removing the crankcase bearings		Remove the parts in the order listed.
	Crankshaft and oil pump		Refer to "CRANKSHAFT AND OIL PUMP".
	Transmission		Refer to "TRANSMISSION".
	Middle drive/driven shaft		Refer to "MIDDLE GEAR".
1	O-ring/collar	1/1	
2	Oil seal	1	
3	Bearing retainer	1	
4	Bearing	9	
			For installation, reverse the removal procedure.





SEPARATING THE CRANKCASE

1. Separate:
   - right crankcase
   - left crankcase

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a. Remove the crankcase bolts.

NOTE:

- Loosen each bolt 1/4 of a turn at a time and after all the bolts are loosened, remove them.
- Loosen the bolts in stages, using a criss-cross pattern.

A Right crankcase
B Left crankcase

b. Remove the left crankcase.

CAUTION:

Use a soft hammer to tap on one side of the crankcase. Tap only on reinforced portions of the crankcase. Do not tap on the crankcase mating surfaces. Work slowly and carefully. Make sure that the crankcase halves separate evenly.

c. Remove the dowel pins.

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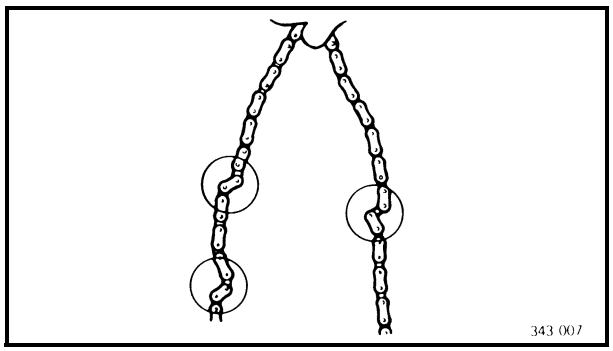
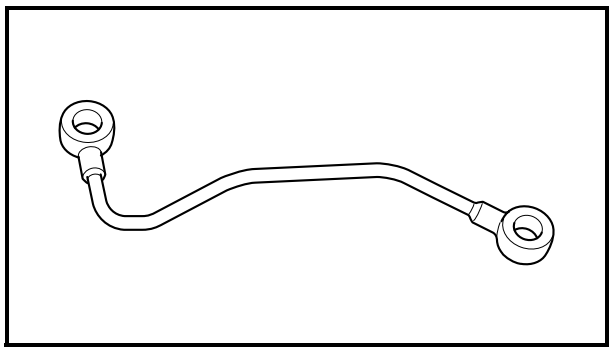


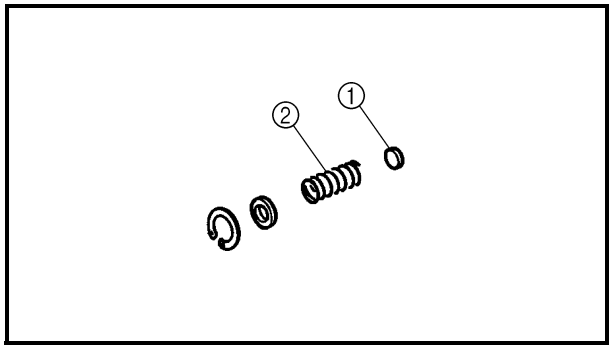
CHECKING THE TIMING CHAIN AND GUIDES

1. Check:
   - timing chain
     Cracks/stiff → Replace the timing chain and camshaft sprocket as a set.
2. Check:
   - timing chain guides
     Wear/damage → Replace.



CHECKING THE OIL DELIVERY PIPE

1. Check:
   - oil delivery pipe
     Cracks/damage → Replace.
     Clogged → Blow out with compressed air.

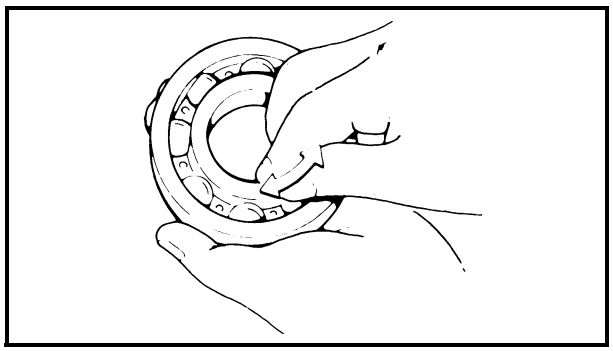


CHECKING THE RELIEF VALVE

1. Check:
   - relief valve ①
   - spring ②
     Damage/wear → Replace the defective part(s).

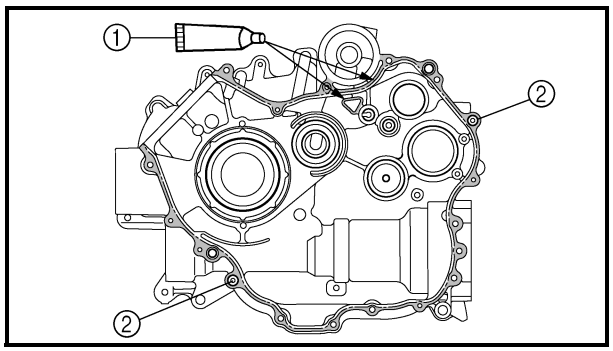
CHECKING THE CRANKCASE

1. Thoroughly wash the case halves in a mild solvent.
2. Clean all the gasket mating surfaces and crankcase mating surfaces thoroughly.
3. Check:
   - crankcase
     Cracks/damage → Replace.
   - oil delivery passages
     Clogged → Blow out with compressed air.



CHECKING THE BEARINGS

1. Check:
   - bearings
     Clean and lubricate, then rotate the inner race with a finger.
     Roughness → Replace.



ASSEMBLING THE CRANKCASE

1. Apply:
   - sealant (Quick Gasket®) ①
     (to the mating surfaces of both case halves)

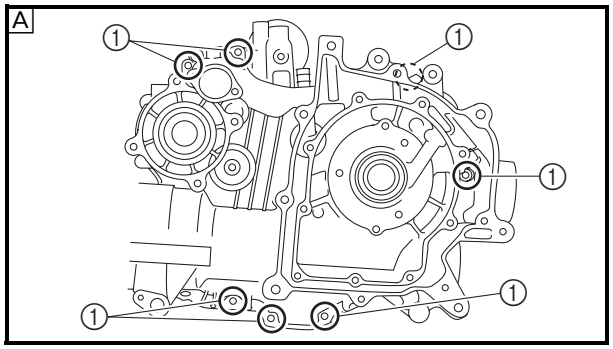
Sealant (Quick Gasket®)
P/N. ACC-11001-05-01
Yamaha bond No. 1215
P/N. 90890-85505

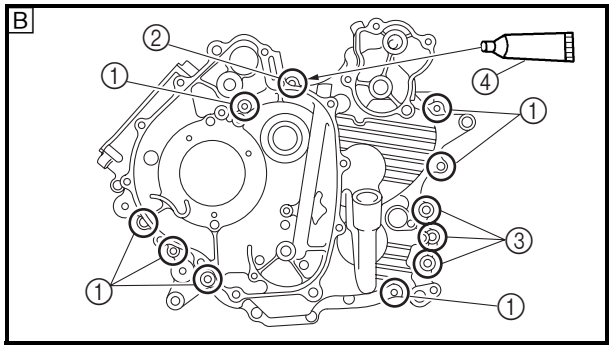
2. Install:
   - dowel pins ②

3. Fit the left crankcase onto the right case. Tap lightly on the case with a soft hammer.

CAUTION:

Before installing and torquing the crankcase holding bolts, be sure to check whether the transmission is functioning properly by manually rotating the shift drum in both directions.





4. Tighten:
   - crankcase bolts ①, ②
     (follow the proper tightening sequence)
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - crankcase bolts ③
     (follow the proper tightening sequence)
     26 Nm (2.6 m · kg, 19 ft · lb)

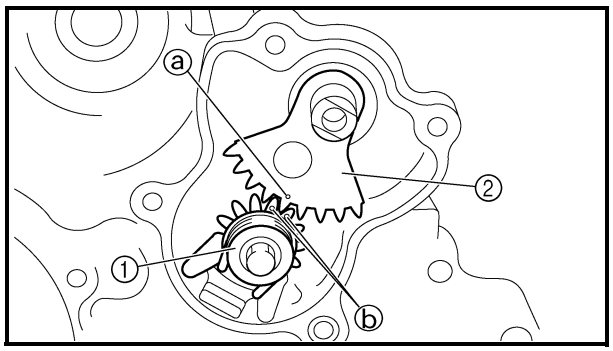
Ⓐ Left crankcase
Ⓑ Right crankcase

NOTE:

- Tighten the bolts in stages, using a criss-cross pattern.
- Apply sealant (Quick Gasket®) ④ to the thread of the bolt ② shown in the illustration.

Sealant (Quick Gasket®)
P/N. ACC-11001-05-01
Yamaha bond No. 1215
P/N. 90890-85505

5. Apply:
   - 4-stroke engine oil
     (to the crank pin, bearing and oil delivery hole)
6. Check:
   - crankshaft and transmission operation
     Unsmooth operation → Repair.



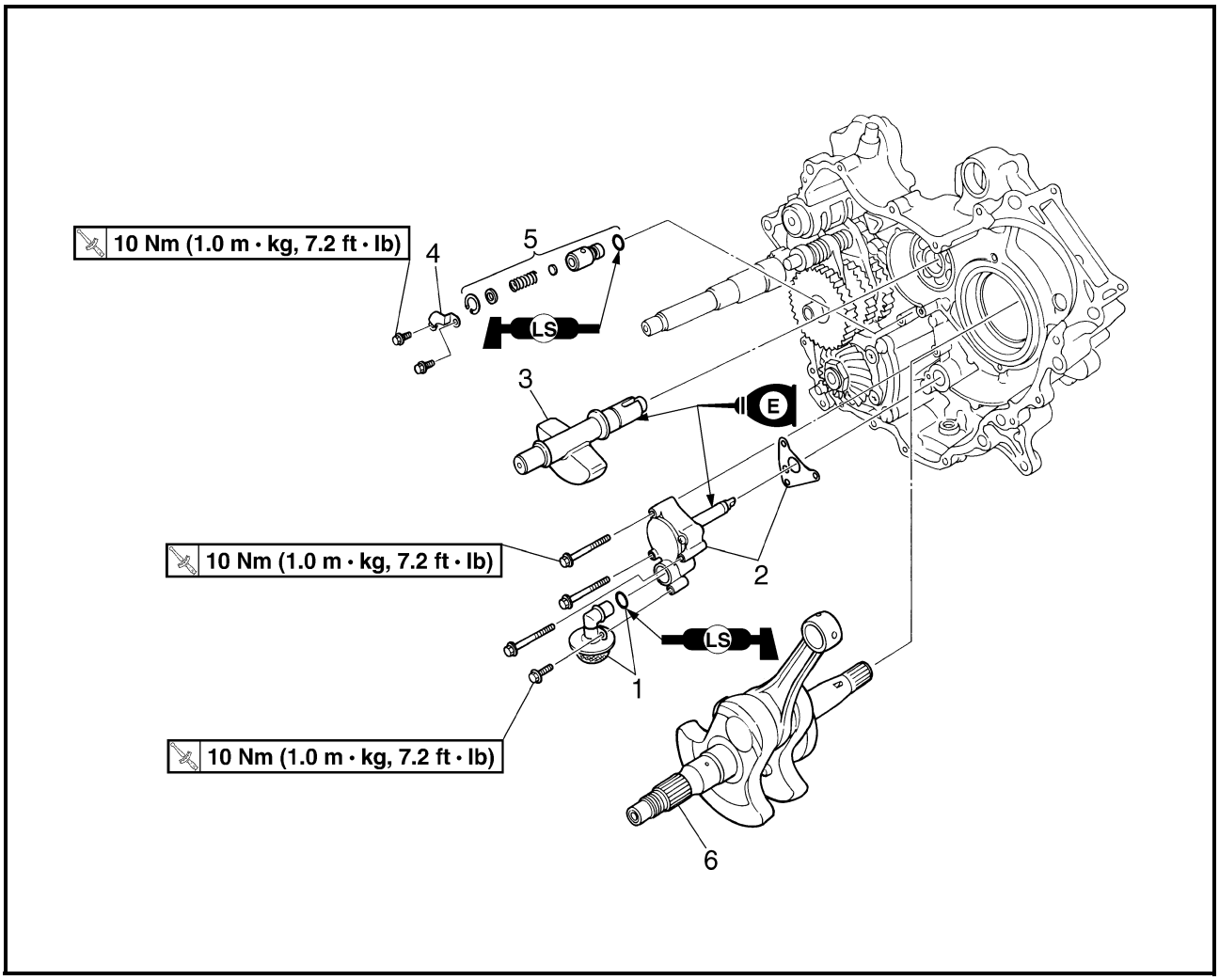
INSTALLING THE SHIFT LEVERS

1. Install:
   - shift lever 2 assembly ①
     14 Nm (1.4 m · kg, 10 ft · lb)
   - shift lever 1 ②

NOTE:

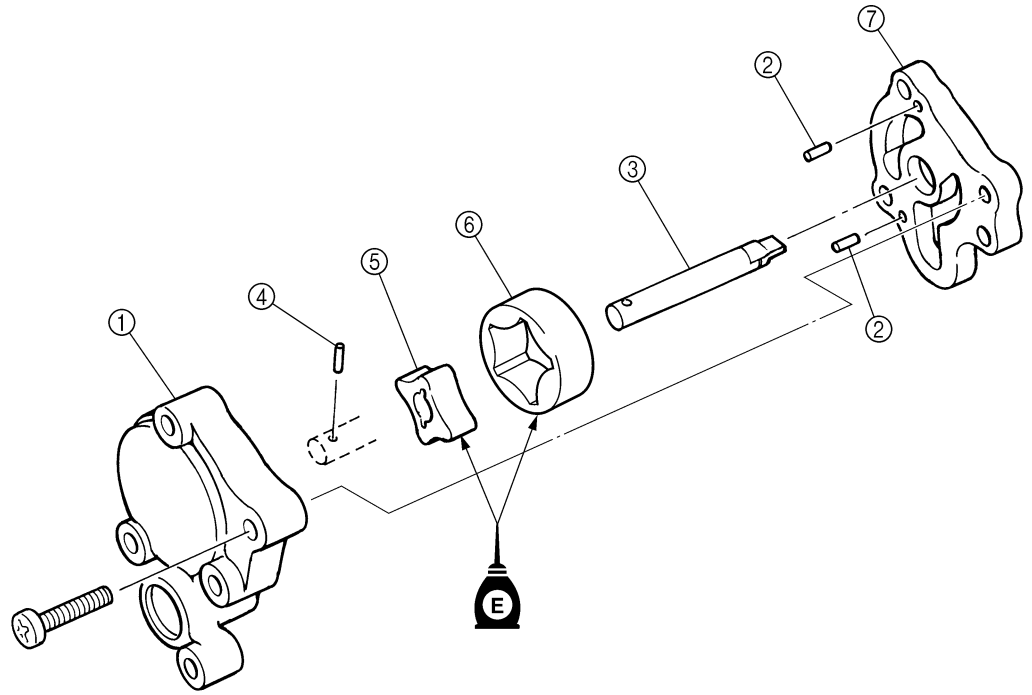
When installing the shift lever 1, align the punch mark ⓐ on the shift lever 1 with the punch marks ⓑ on the shift lever 2.

CRANKSHAFT AND OIL PUMP

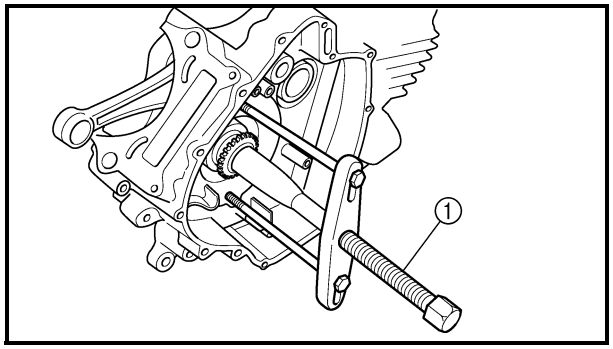


Order	Job/Part	Q'ty	Remarks
	Removing the crankshaft and oil pump		Remove the parts in the order listed.
	Crankcase separation		Refer to "CRANKCASE".
1	Oil strainer/O-ring	1/1	
2	Oil pump assembly/gasket	1/1	
3	Balancer	1	Refer to "REMOVING THE CRANKSHAFT" and "INSTALLING THE CRANKSHAFT AND BALANCER".
4	Plate	1	
5	Relief valve assembly	1	
6	Crankshaft	1	
			For installation, reverse the removal procedure.

OIL PUMP



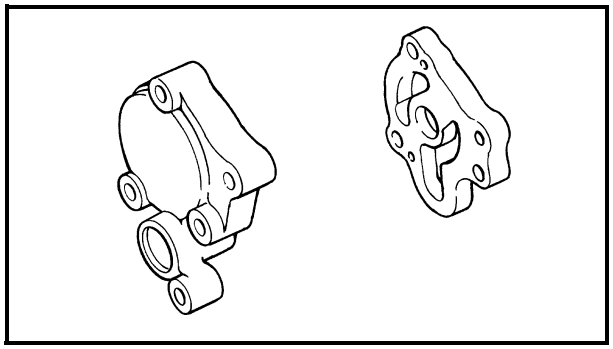
Order	Job/Part	Q'ty	Remarks
	Disassembling the oil pump		Remove the parts in the order listed.
①	Rotor cover	1	
②	Pin	2	
③	Shaft	1	
④	Pin	1	
⑤	Inner rotor	1	
⑥	Outer rotor	1	
⑦	Oil pump housing	1	
			For assembly, reverse the disassembly procedure.



REMOVING THE CRANKSHAFT

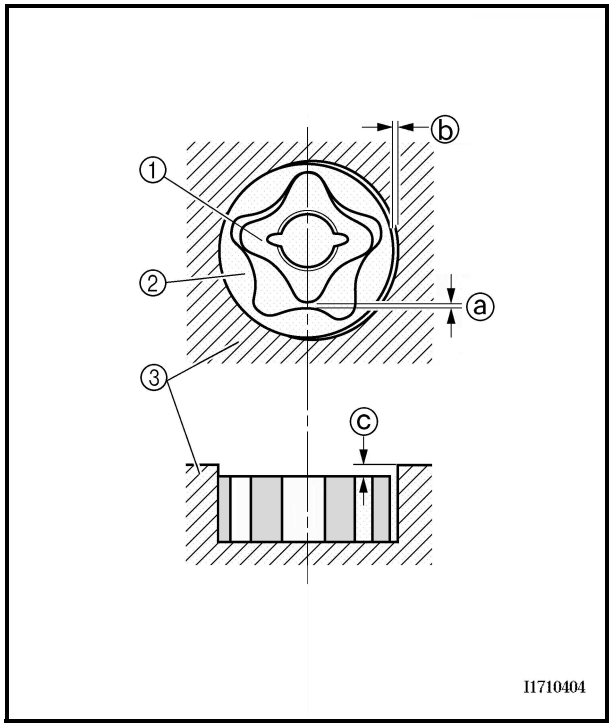
1. Remove:
   - crankshaft
     Use a crankcase separating tool ①.

	Crankcase separating tool **P/N. YU-01135-A, 90890-01135**



CHECKING THE OIL PUMP

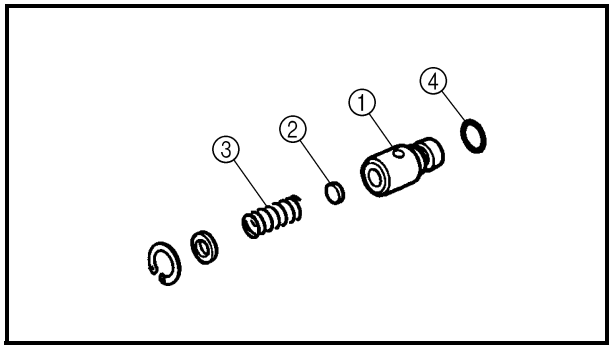
1. Check:
   - rotor housing
   - rotor cover
     Cracks/wear/damage → Replace.



2. Measure:
   - tip clearance ⓐ
     (between the inner rotor ① and the outer rotor ②)
   - side clearance ⓑ
     (between the outer rotor ② and the pump housing ③)
   - body clearance ⓒ
     (between the outer rotor ② and the pump housing ③)
     Out of specification → Replace the oil pump.

	Tip clearance **less than 0.15 mm (0.0059 in)** **<Limit>: 0.23 mm (0.0091 in)** **Side clearance** **0.03 ~ 0.10 mm** **(0.0012 ~ 0.0039 in)** **<Limit>: 0.17 mm (0.0067 in)** **Body clearance** **0.09 ~ 0.17 mm** **(0.0035 ~ 0.0067 in)** **<Limit>: 0.24 mm (0.0094 in)**

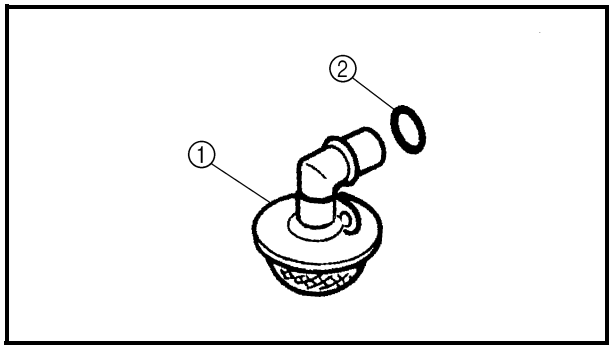
3. Check:
   - oil pump operation
     Unsmooth → Repeat steps #1 and #2 or replace the defective parts.



CHECKING THE RELIEF VALVE

1. Check:
   - relief valve body ①
   - relief valve ②
   - spring ③
   - O-ring ④

   Damage/wear → Replace the defective part(s).



CHECKING THE OIL STRAINER

1. Check:
   - oil strainer ①
   - O-ring ②

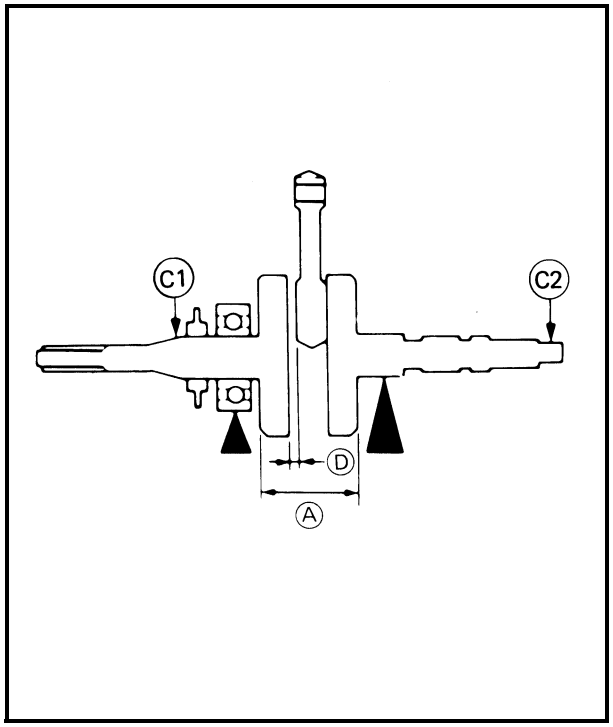
   Damage → Replace.
   Contaminants → Clean with engine oil.

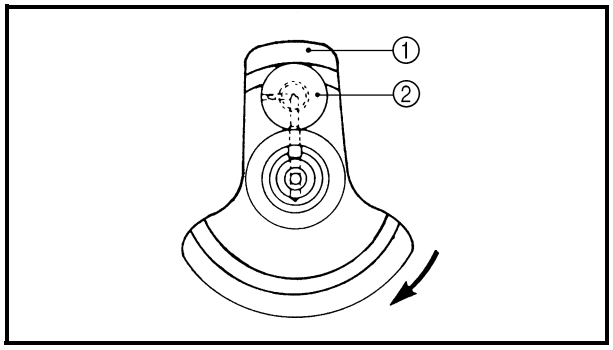
ASSEMBLING THE OIL PUMP

1. Install:
   - inner rotor
   - outer rotor
   - oil pump shaft

   (with the recommended lubricant)

	Recommended lubricant **Engine oil**





CHECKING THE CRANKSHAFT

1. Measure:
   - crank width Ⓐ
     Out of specification → Replace the crankshaft.

Crank width
74.95 ~ 75.00 mm
(2.9508 ~ 2.9528 in)

   - side clearance Ⓓ
     Out of specification → Replace the crankshaft.

Big end side clearance
0.35 ~ 0.65 mm
(0.0138 ~ 0.0256 in)
<Limit>: 1.0 mm (0.0394 in)

   - runout Ⓒ
     Out of specification → Replace the crankshaft.

Runout limit
C1: 0.03 mm (0.0012 in)
C2: 0.03 mm (0.0012 in)

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The crankshaft ① and the crank pin ② oil passages must be properly interconnected with a tolerance of less than 1 mm (0.04 in).

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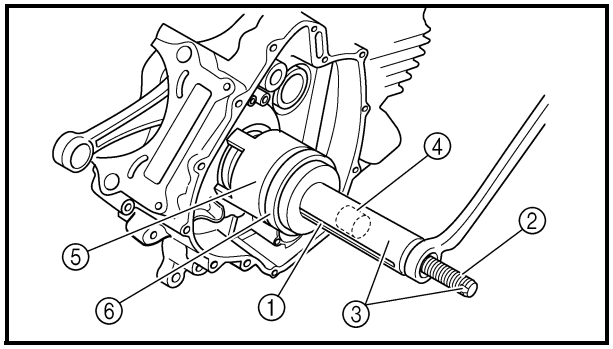
CAUTION:

The buffer boss and woodruff key should be replaced when removed from the crankshaft.



INSTALLING THE CRANKSHAFT AND BALANCER

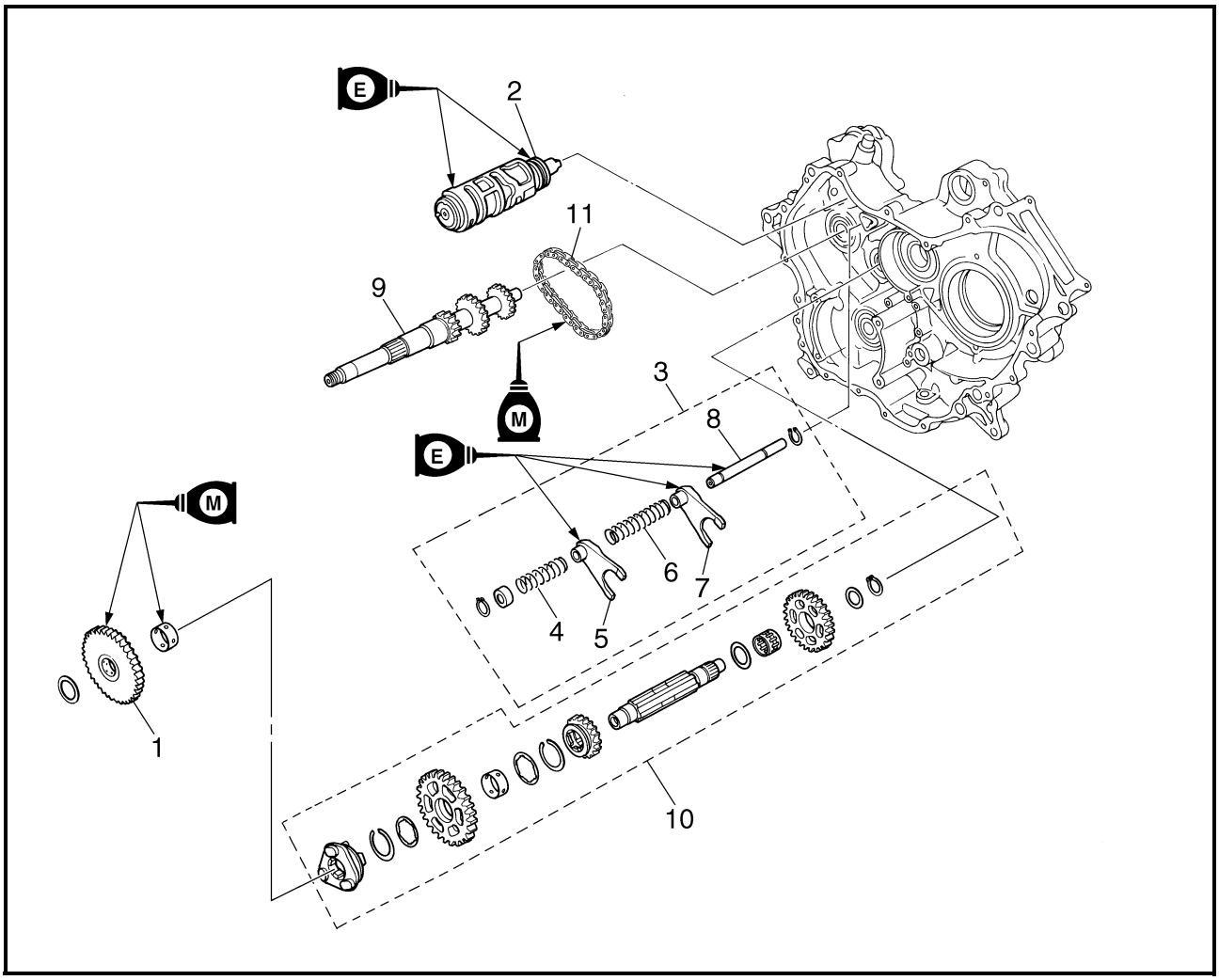
1. Install:
   - crankshaft

Crankshaft installer pot ①
P/N. 90890-01274
Crankshaft installer bolt ②
P/N. 90890-01275
Crankshaft installer set ③
P/N. YU-90050
Adapter ④
P/N. YM-01383, 90890-01383
Spacer (crankshaft installer) ⑤
P/N. YM-91044, 90890-04081
Spacer ⑥
P/N. 90890-01309

NOTE:
Hold the connecting rod at the Top Dead Center (TDC) with one hand while turning the nut of the installing tool with the other. Operate the installing tool until the crankshaft bottoms against the bearing.

CAUTION:
Apply engine oil to each bearing to protect the crankshaft against scratches and to make installation easier.

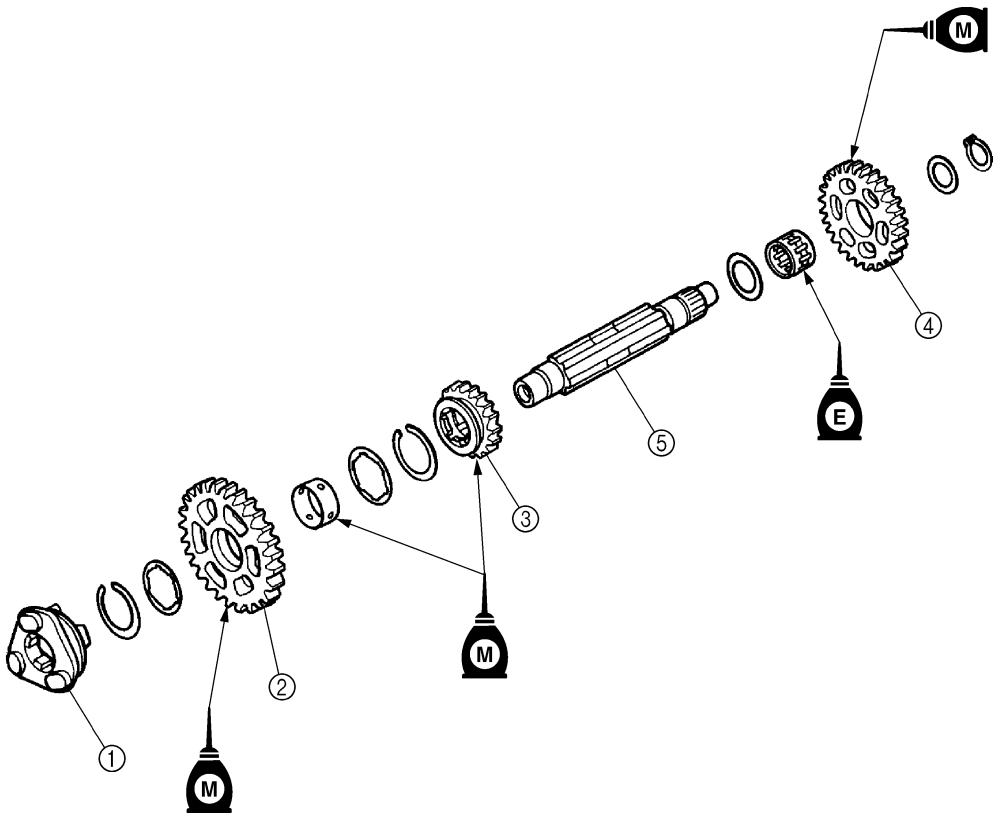
TRANSMISSION



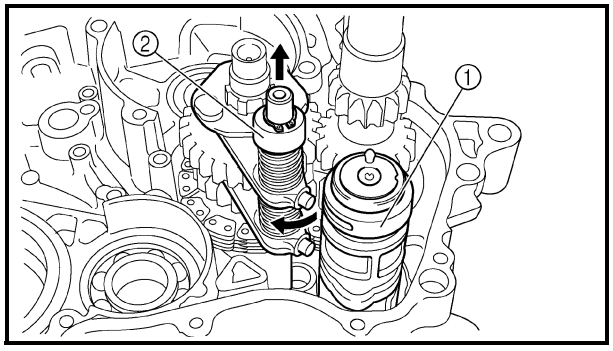
Order	Job/Part	Q'ty	Remarks
	Removing the transmission		Remove the parts in the order listed.
	Crankcase separation		Refer to "CRANKCASE".
	Middle driven gear		Refer to "MIDDLE GEAR".
1	Low wheel gear	1	
2	Shift drum	1	
3	Shift fork assembly	1	
4	Short spring	1	White painting
5	Shift fork 1	1	
6	Long spring	1	
7	Shift fork 2	1	
8	Guide bar	1	
9	Secondary shaft	1	
10	Drive axle assembly	1	
11	Chain	1	
			For installation, reverse the removal procedure.

Refer to "REMOVING THE TRANSMISSION" and "INSTALLING THE TRANSMISSION".

DRIVE AXLE ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	Disassembling the drive axle assembly		Remove the parts in the order listed.
①	Clutch dog	1	
②	High wheel gear	1	
③	Middle drive gear	1	
④	Driven sprocket	1	
⑤	Drive axle	1	
			For assembly, reverse the disassembly procedure.



REMOVING THE TRANSMISSION

1. Remove:
   - shift drum ①
   - shift fork assembly ②

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a. Pull out the guide bar from the right crankcase.
b. Slide the shift fork assembly and remove the shift fork followers from the shift drum grooves.
c. Remove the shift drum.
d. Remove the shift fork assembly.

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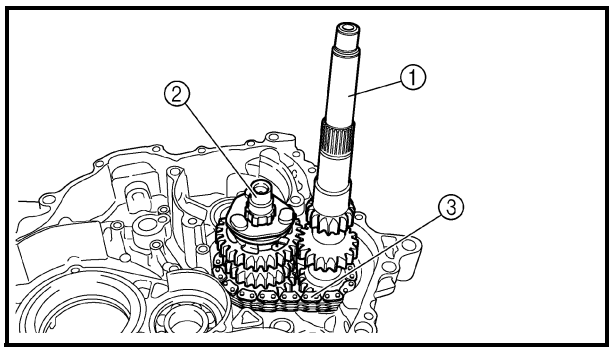
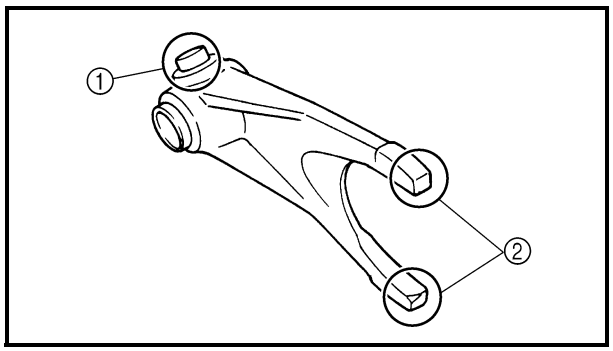


2. Remove:
   - secondary shaft ①
   - drive axle assembly ②
   - chain ③

NOTE:

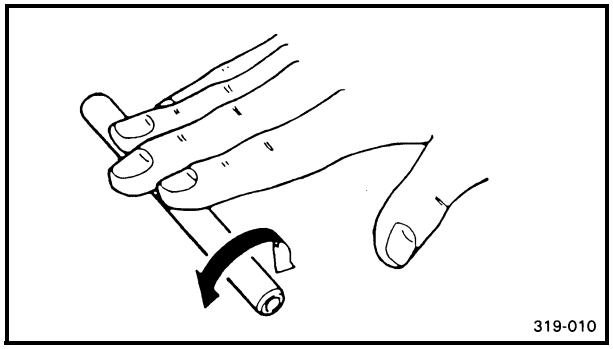
Remove the secondary shaft, drive axle assembly, and chain as a set.



CHECKING THE SHIFT FORKS

1. Check:
   - shift fork follower ①
   - shift fork pawl ②

   Scoring/bends/wear/damage → Replace.

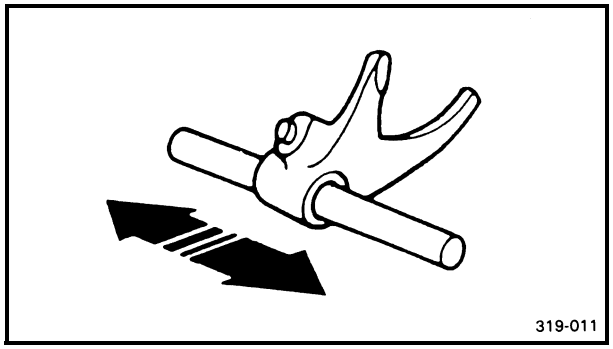


2. Check:
   - guide bar

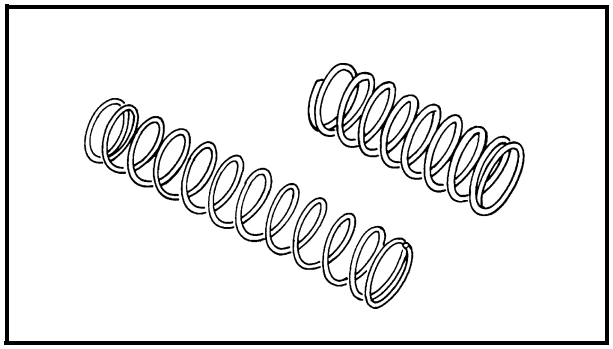
   Roll the guide bar on a flat surface.
   Bends → Replace.

⚠ WARNING

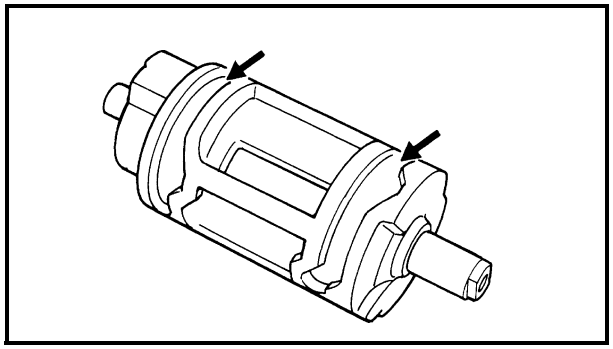
Do not attempt to straighten a bent guide bar.



3. Check:
   • shift fork movement
   (on the guide bar)
   Unsmooth operation → Replace the shift fork and the guide bar.

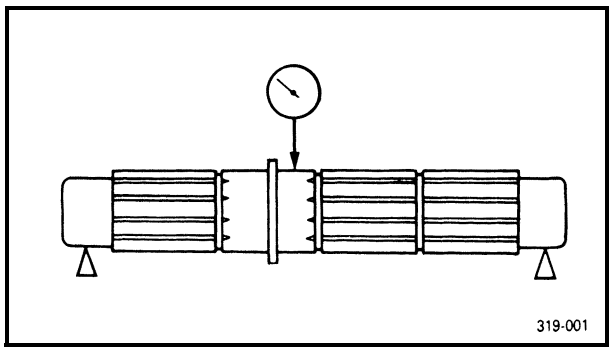


4. Check:
   • springs
   Cracks/damage → Replace.



CHECKING THE SHIFT DRUM

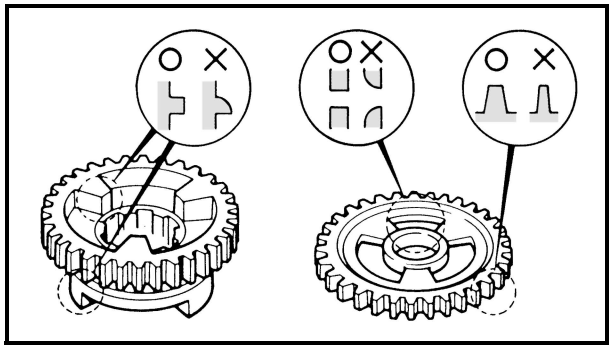
1. Check:
   • shift drum grooves
   Scratches/wear/damage → Replace.



CHECKING THE DRIVE AXLE

1. Measure:
   • axle runout
   Use a centering device and a dial gauge.
   Out of specification → Replace the bent axle.

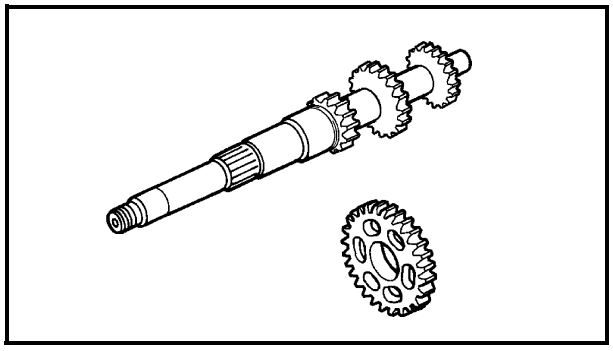
	Drive axle runout limit **0.06 mm (0.0024 in)**



CHECKING THE HIGH WHEEL GEAR AND MIDDLE DRIVE GEAR

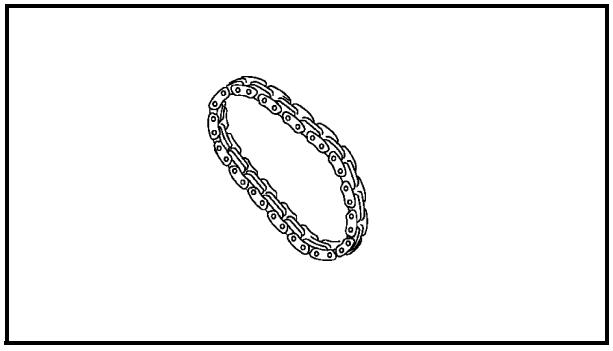
1. Check:
   • gear teeth
   Blue discoloration/pitting/wear → Replace.
   • mated dogs
   Rounded edges/cracks/missing portions → Replace.

2. Check:
   • gear movement
   Unsmooth → Repeat steps #1 or replace the defective parts.
3. Check:
   • circlip
   Bends/looseness/damage → Replace.



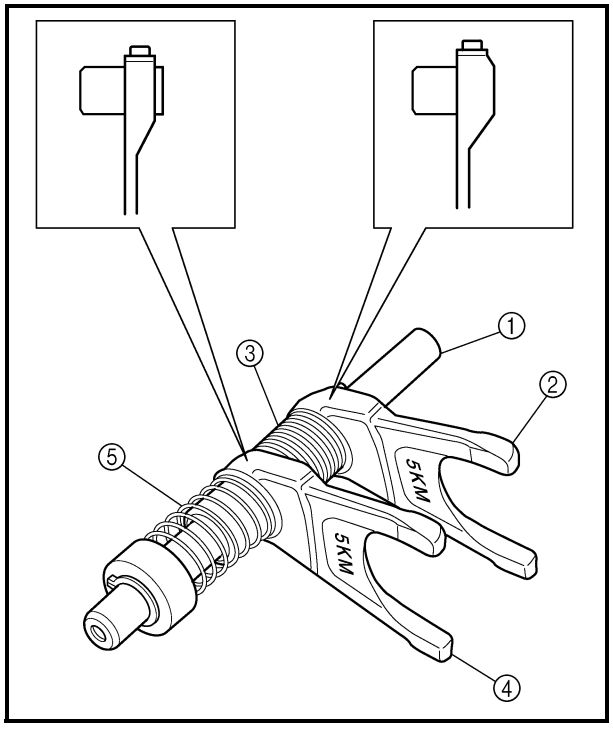
CHECKING THE SECONDARY SHAFT AND DRIVEN SPROCKET

1. Check:
   • gear teeth
   Blue discoloration/pitting/wear → Replace.
2. Check:
   • gear movement
   Unsmooth → Repeat steps #1 or replace the defective parts.
3. Check:
   • circlip
   Bends/looseness/damage → Replace.



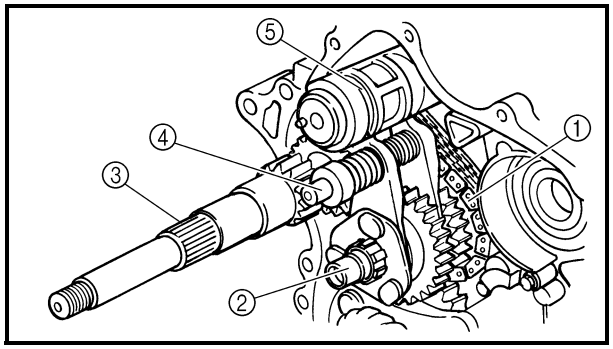
CHECKING THE CHAIN

1. Check:
   • chain
   Cracks/shift → Replace the chain, secondary shaft and driven sprocket as a set.



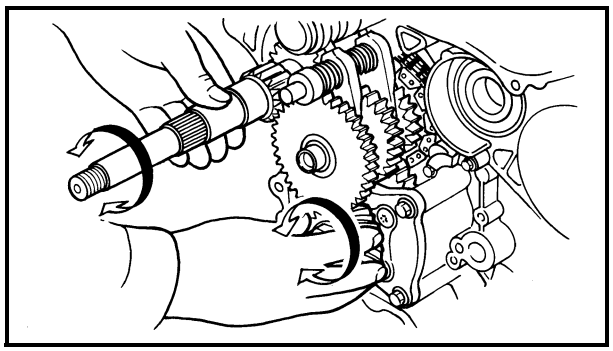
ASSEMBLING THE SHIFT FORK ASSEMBLY

1. Install:
   - guide bar ①
   - shift fork 2 ②
   - long spring ③
   - shift fork 1 ④
   - short spring ⑤



INSTALLING THE TRANSMISSION

1. Install:
   - chain ①
   - drive axle assembly ②
   - secondary shaft ③
   - shift fork assembly ④
   - shift drum ⑤
   - low wheel gear



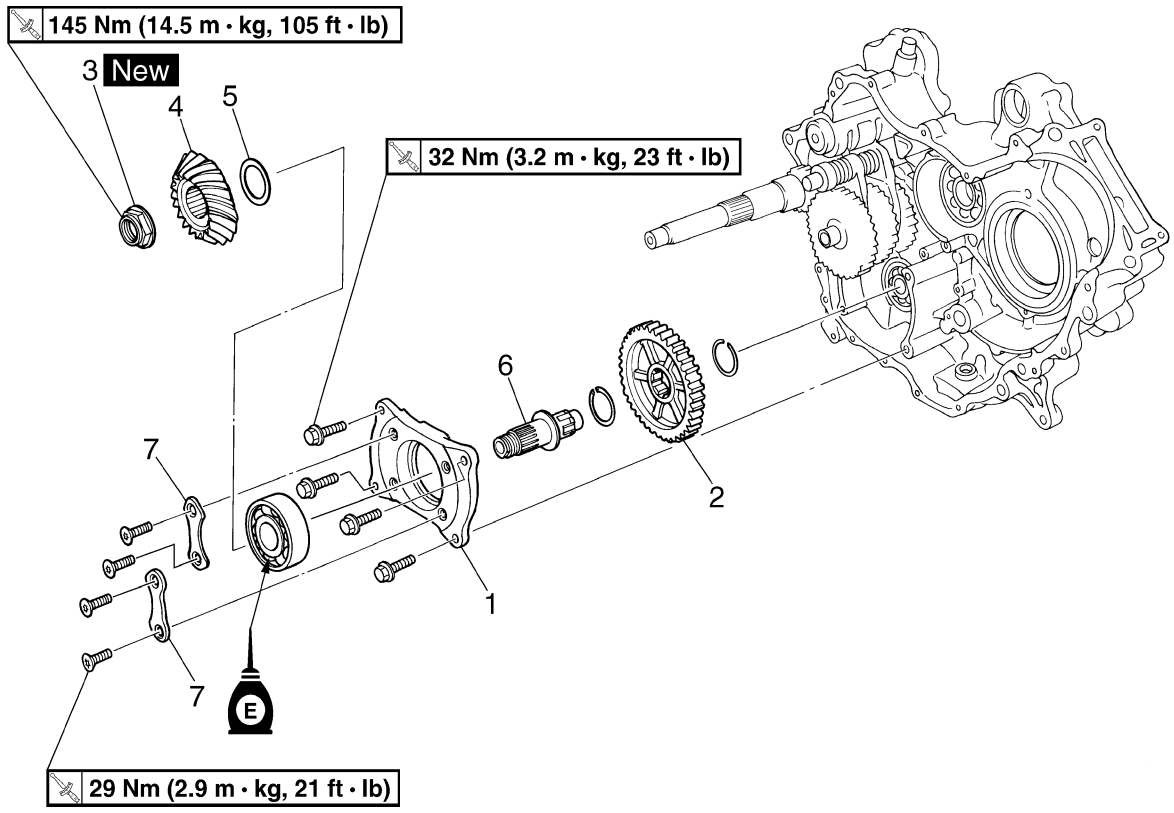
2. Check:
   - shift operation
     Unsmooth operation → Repair.

NOTE:

- Oil each gear and bearing thoroughly.
- Before assembling the crankcase, be sure that the transmission is in neutral and that the gears turn freely.

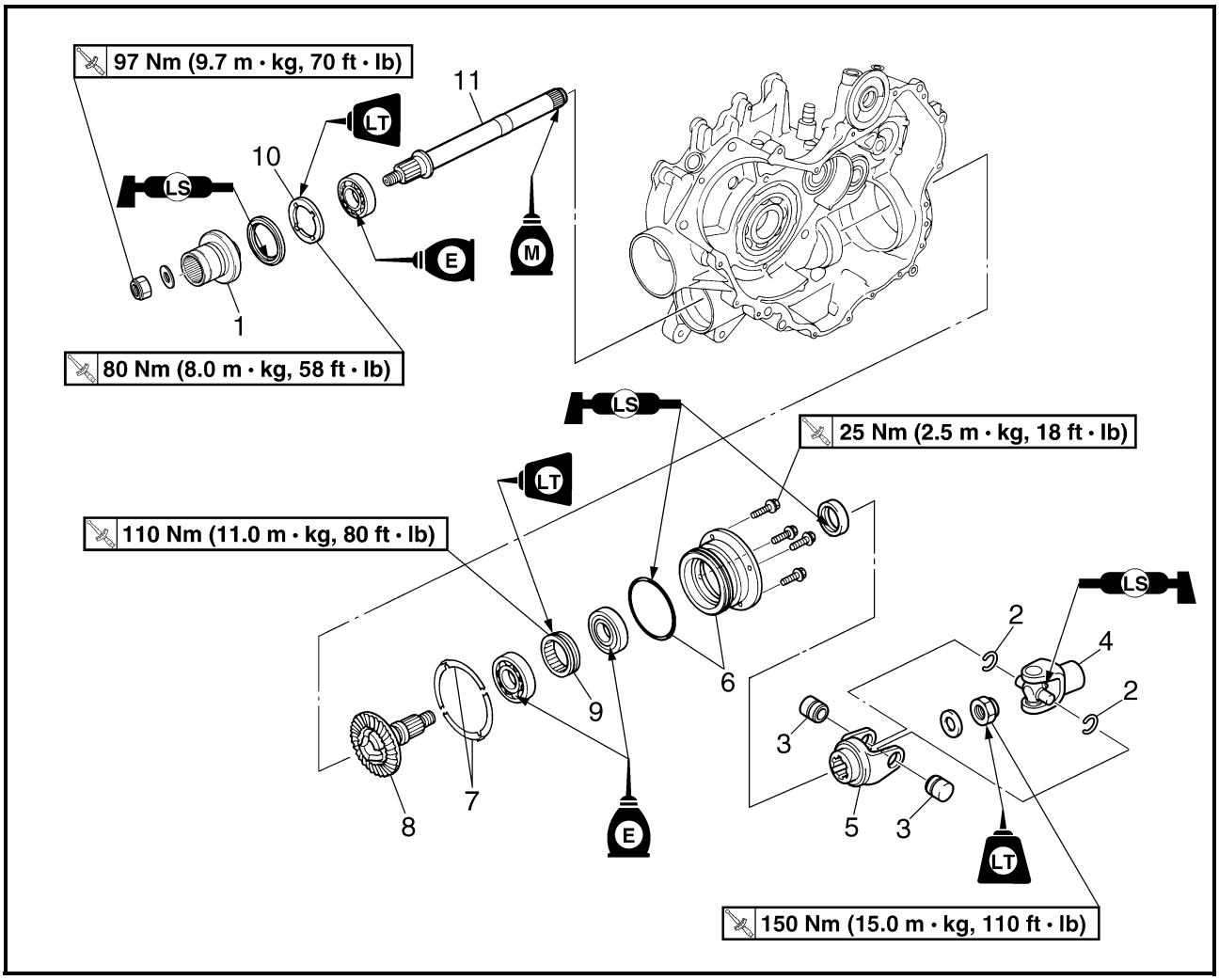
MIDDLE GEAR

MIDDLE DRIVE SHAFT

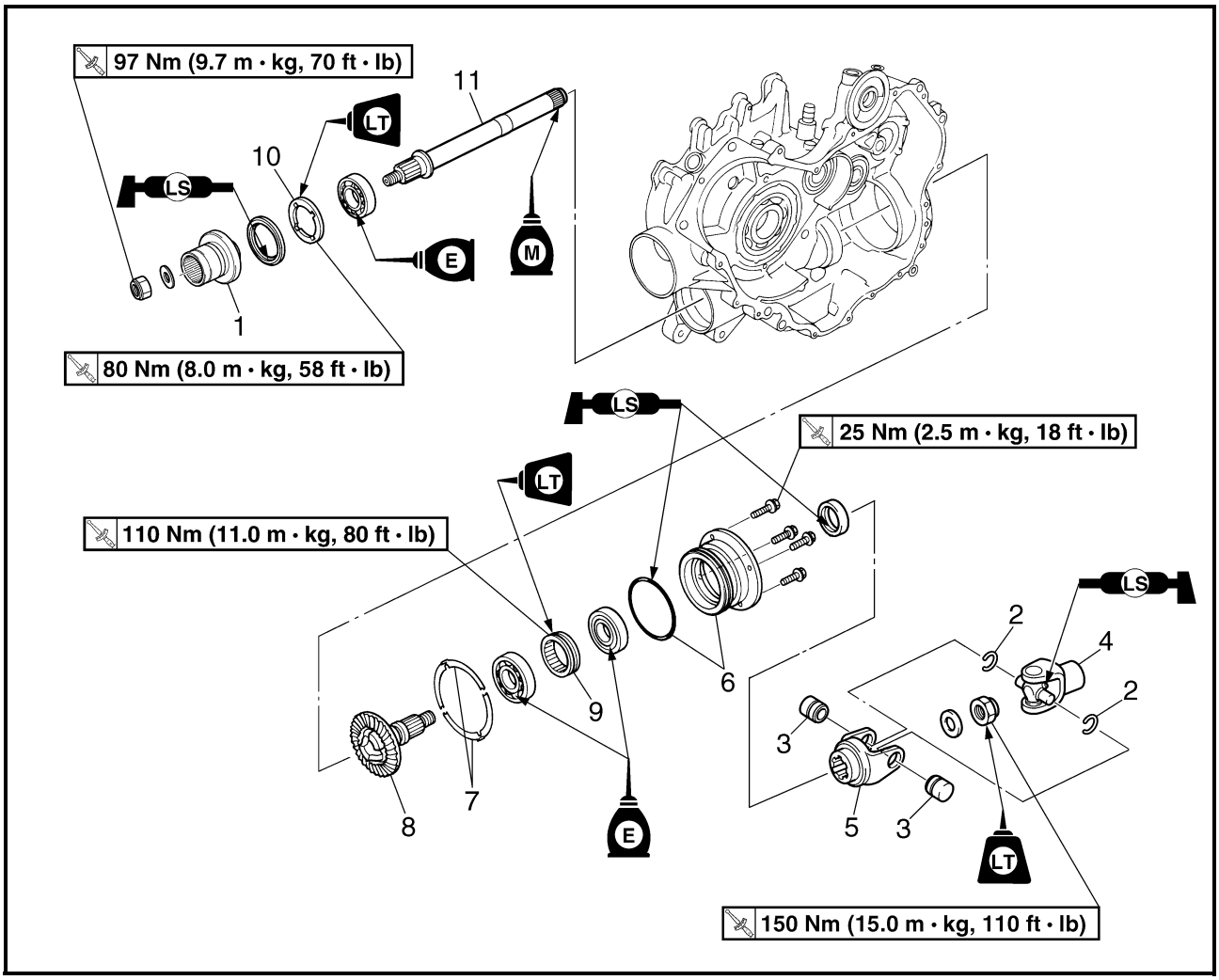


Order	Job/Part	Q'ty	Remarks
	Removing the middle drive shaft		Remove the parts in the order listed.
	Crankcase separation		Refer to "CRANKCASE".
1	Bearing housing	1	
2	Middle driven gear	1	
3	Nut	1	Refer to "REMOVING THE MIDDLE DRIVE SHAFT" and "INSTALLING THE MIDDLE DRIVE SHAFT".
4	Middle drive pinion gear	1	
5	Shim		Refer to "SELECTING THE MIDDLE DRIVE AND DRIVEN GEAR SHIMS".
6	Middle drive shaft	1	
7	Bearing retainer	2	
			For installation, reverse the removal procedure.

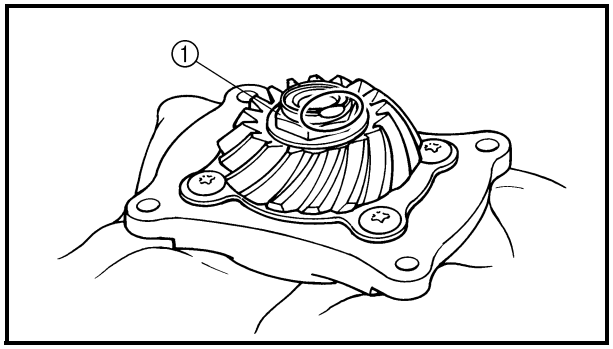
MIDDLE DRIVEN SHAFT



Order	Job/Part	Q'ty	Remarks
	Removing the middle driven shaft		Remove the parts in the order listed.
	Crankcase separation		Refer to "CRANKCASE".
1	Drive shaft coupling	1	
2	Circlip	2	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT" and "INSTALLING THE MIDDLE DRIVEN SHAFT".
3	Bearing	2	
4	Universal joint	1	
5	Universal joint yoke	1	
6	Bearing housing/O-ring	1/1	
7	Shim		Refer to "SELECTING THE MIDDLE DRIVE AND DRIVEN GEAR SHIMS".
8	Middle driven pinion gear	1	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT" and "INSTALLING THE MIDDLE DRIVEN SHAFT".
9	Bearing retainer	1	



Order	Job/Part	Q'ty	Remarks
10	Bearing retainer	1	
11	Middle driven shaft	1	
			For installation, reverse the removal procedure.



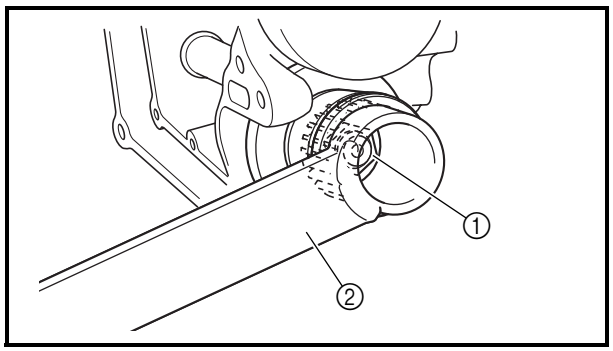
REMOVING THE MIDDLE DRIVE SHAFT

1. Straighten:
   - punched portion of the nut (middle drive pinion gear)
2. Loosen:
   - middle drive pinion gear nut ①

NOTE:

Secure the middle drive shaft in the vise with a clean rag.

3. Remove:
   - middle drive pinion gear nut
   - middle drive pinion gear
   - shim(s)



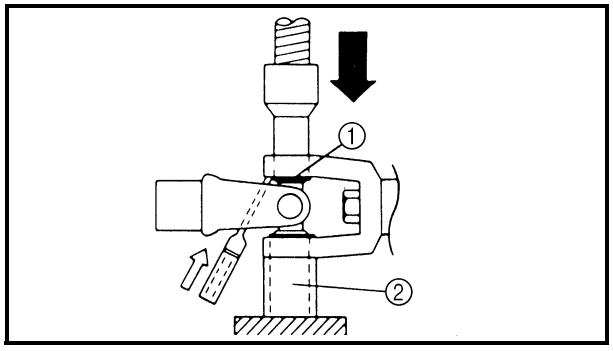
REMOVING THE MIDDLE DRIVEN SHAFT

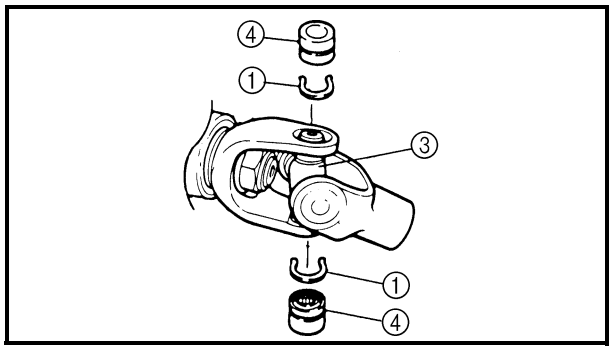
1. Remove:
   - nut ①
   - washer
   - drive shaft coupling

NOTE:

Use the coupling gear/middle shaft tool ② to hold the drive shaft coupling.

	Coupling gear/middle shaft tool P/N. YM-01229, 90890-01229





2. Remove:
   • universal joint

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a. Remove the circlips ①.
b. Place the universal joint in a press.
c. With a suitable diameter pipe ② beneath the yoke ③, press the bearing ④ into the pipe as shown.

NOTE:
It may be necessary to lightly tap the yoke with a punch.

d. Repeat the steps for the opposite bearing.
e. Remove the yoke.

NOTE:
It may be necessary to lightly tap the yoke with a punch.

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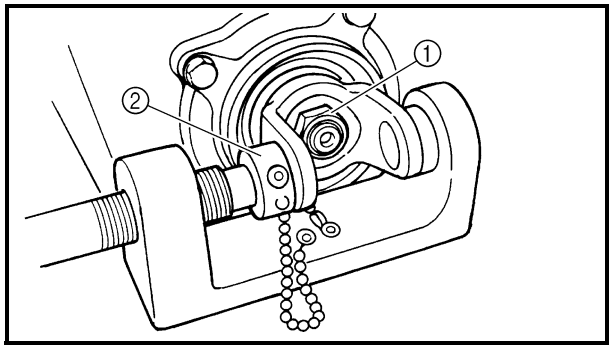
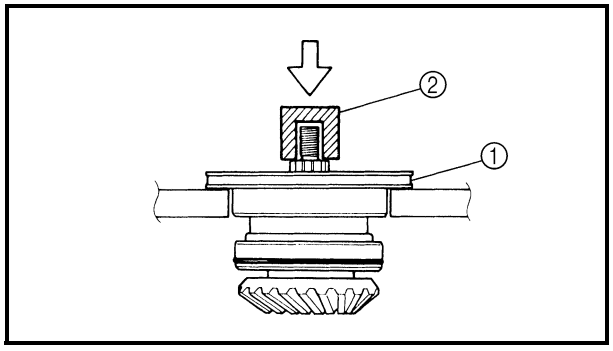


3. Remove:
   • nut ①
   • washer
   • universal joint yoke

NOTE:
Use the universal joint holder ② to hold the universal joint yoke.

Universal joint holder
P/N. YM-04062, 90890-04062



4. Remove:
   • bearing housing assembly ①

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a. Clean the outside of the bearing housing assembly.
b. Place the bearing housing assembly onto a hydraulic press.

CAUTION:

- **Never directly press the middle driven pinion gear end with a hydraulic press, this will result in damage to the middle driven pinion gear thread.**
- **Install the suitable socket ② on the middle driven pinion gear end to protect the thread from damage.**

c. Press the middle driven pinion gear end and remove the bearing housing.

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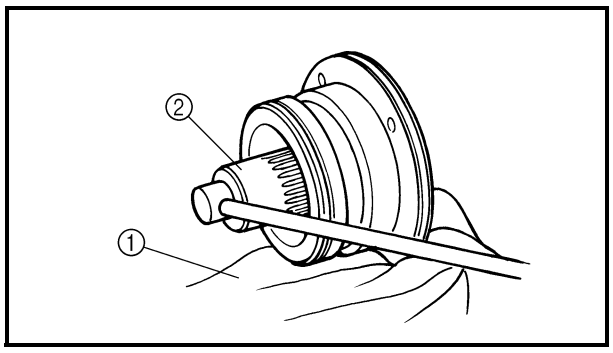

5. Remove:
   • bearing retainer
   • bearing

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a. Place a rag ① in the vise.
b. Secure the bearing housing edge in the vise.
c. Attach the bearing retainer wrench ②.

	Bearing retainer wrench **P/N. YM-04128, 90890-04128**

CAUTION:

The middle driven shaft bearing retainer has left-handed threads. To loosen the retainer, turn it clockwise.

d. Remove the bearing retainer and bearing.

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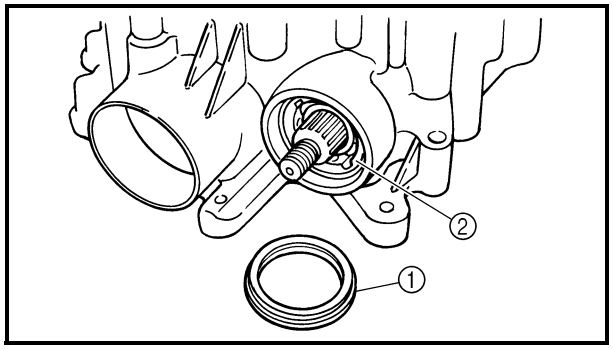
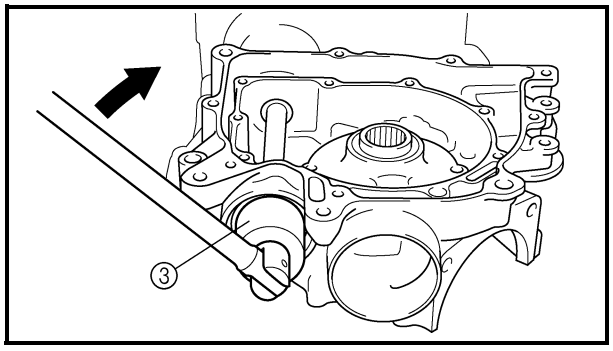


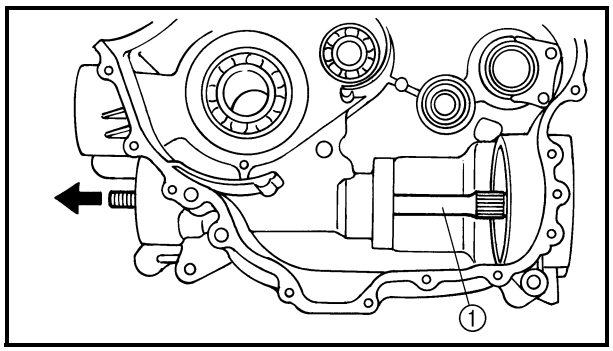
6. Remove:
   - drive shaft coupling
   - oil seal ①
   - bearing retainer ②
   - bearing

NOTE:
Attach the ring nut wrench ③.

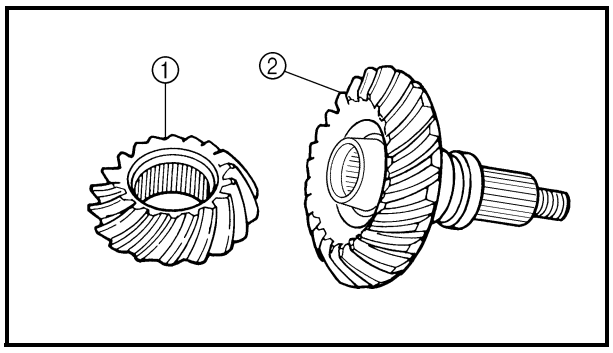
	Ring nut wrench **P/N. YM-38404, 90890-01430**



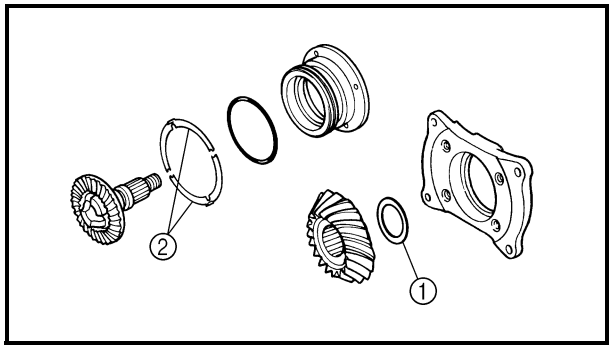
CAUTION:
The middle driven shaft bearing retainer has left-handed threads. To loosen the retainer, turn it clockwise.

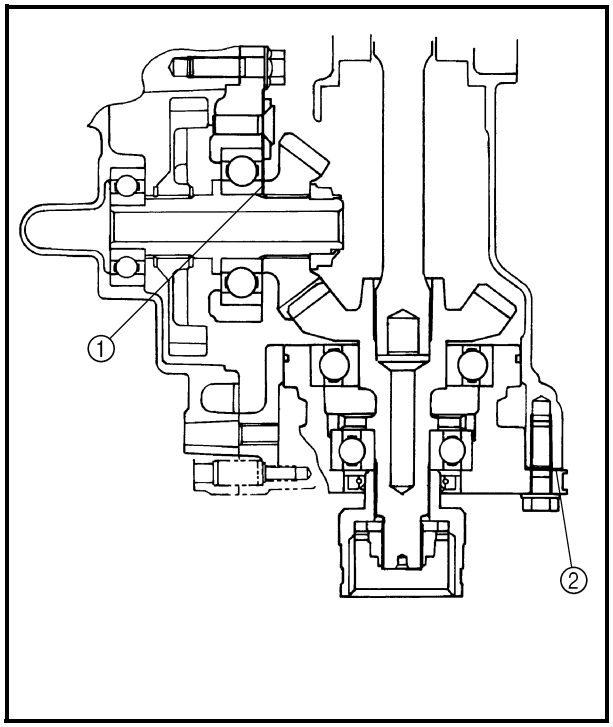


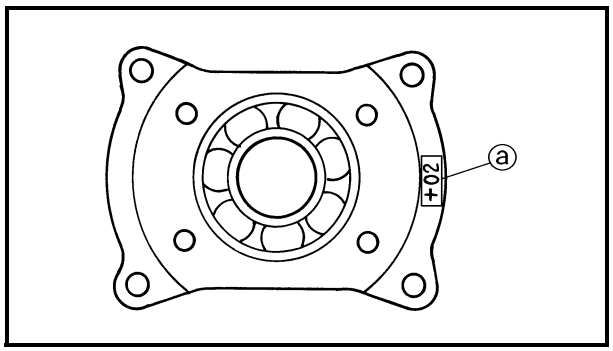
7. Remove:
   - middle driven shaft ①
     (with bearing)

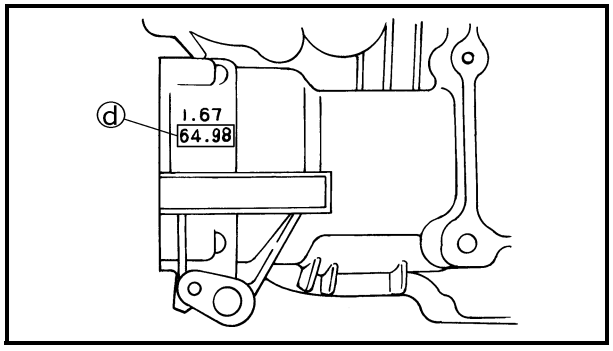


CHECKING THE PINION GEARS
1. Check:
   - gear teeth (drive pinion gear) ①
   - gear teeth (driven pinion gear) ②
     Pitting/galling/wear → Replace.
2. Check:
   - O-ring
     Damage → Replace.
   - bearings
     Pitting/damage → Replace.
3. Check:
   - universal joint movement
     Roughness → Replace universal joint.









SELECTING THE MIDDLE DRIVE AND DRIVEN GEAR SHIMS

When the drive and driven gear, bearing housing assembly and/or crankcase replaced, be sure to adjust the gear shims ① and ②.

1. Select:
   - middle drive gear shim ①
   - middle driven gear shim ②

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a. Position middle drive and driven gear by using shims ① and ② with their respective thickness calculated from information marked on crankcase, bearing housing and drive gear end.

① Shim thickness “A”
② Shim thickness “B”

b. To find shim thickness “A” use following formula:

Middle drive pinion gear shim thickness “A” = ⓐ + ⓓ – ⓑ – ⓒ

Where:

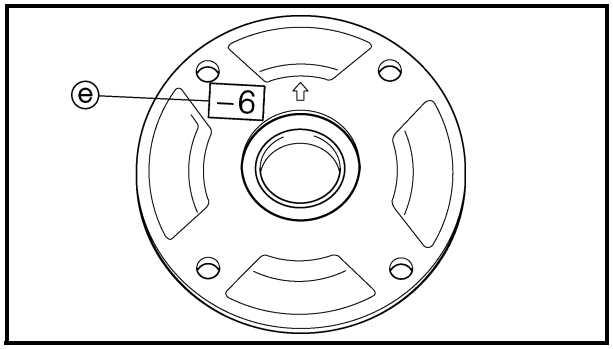
ⓐ = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “7.5”.
ⓑ = 17.0
ⓒ = drive pinion gear to driven pinion gear center distance (considered constance “55”).
ⓓ = a numeral (usually a decimal number) on the left crankcase specifies a thickness of “65”.

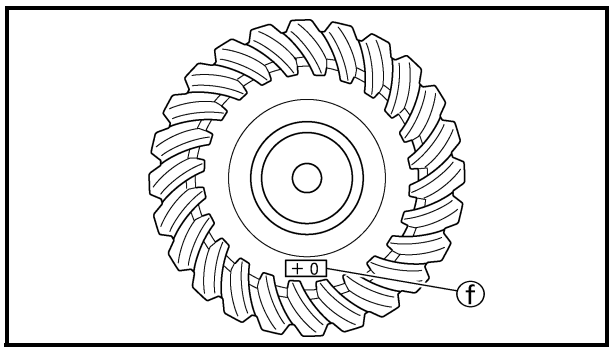
Example:
1) If the bearing housing is marked “+02”, ... ⓐ is 7.52,
2) ⓑ is 17
3) ⓒ is 55
4) If the crankcase (left) is marked “64.98”, ... ⓓ is 64.98.
5) Therefore, the shim thickness is 0.50 mm.
   A = 7.52 + 64.98 – 17 – 55
   = 0.50
6) Round off hundredths digit and select appropriate shim(s).
   In the example above, the calculated shim thickness is 0.50 mm. The chart instructs you, however, to round off 0 to 0.

Hundredths	Round value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thickness.

Middle drive pinion gear shim	
Thickness (mm)	0.10 0.30 0.15 0.40 0.20 0.50

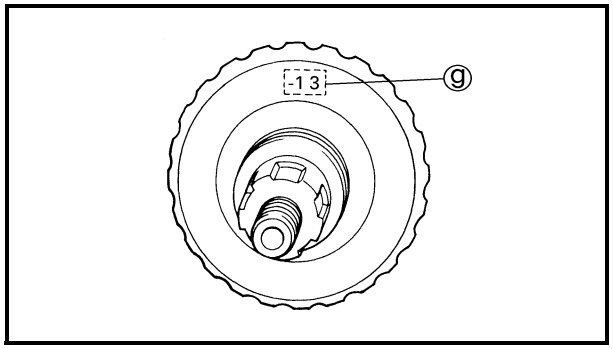


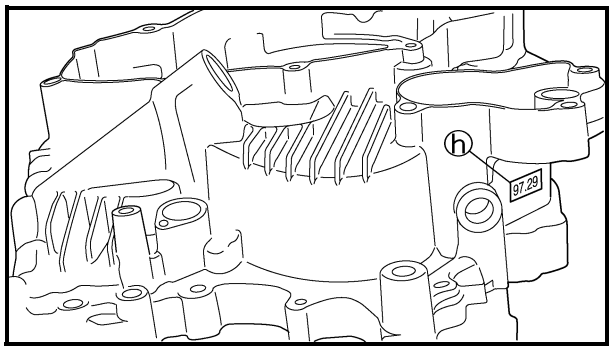


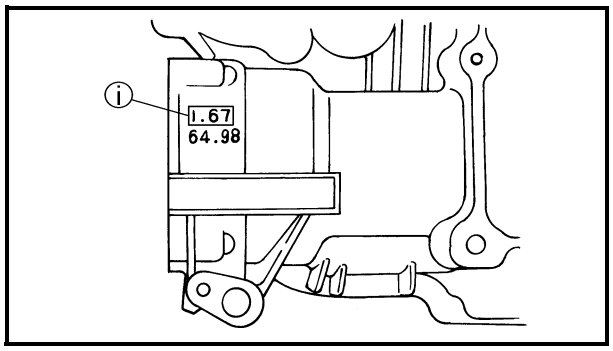
c. To find shim thickness “B” use the following formula:

Middle driven pinion gear shim thickness “B” = ⓔ – ⓕ + ⓖ – ⓗ + ⓘ – 0.05

Where:
ⓔ = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “76”.
ⓕ = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from “60”.







ⓖ = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from "80.5".

ⓗ = a numeral (usually a decimal number) on the right crankcase specifies a thickness of "97.26".

ⓘ = a numeral (usually a decimal number) on the left crankcase specifies a thickness of "1.66".

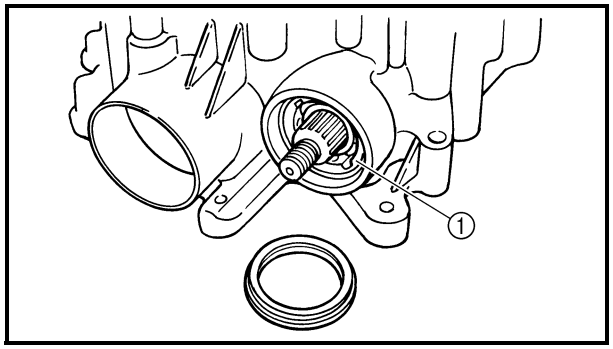
Example:

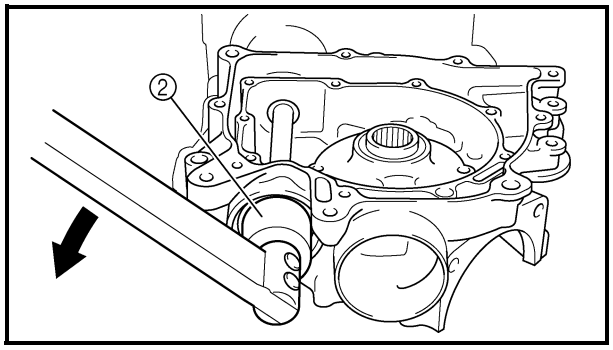
1) If the bearing housing is marked "–06", ... ⓔ is 75.94.
2) If the driven pinion gear is marked "+0", ... ⓕ is 60.00.
3) If the driven pinion gear is marked "–13", ... ⓖ is 80.37.
4) If the crankcase (right) is marked "97.29", ... ⓗ is 97.29.
5) If the crankcase (left) is marked "1.67", ... ⓘ is 1.67.
6) Therefore, the shim thickness is 0.64 mm.
   B = 75.94 – 60.00 + 80.37 – 97.29 + 1.67– 0.05
   = 0.64
7) Round off hundredths digit and select appropriate shim(s).
   In the example above, the calculated shim thickness is 0.64 mm. The chart instructs you, however, to round off 4 to 5.

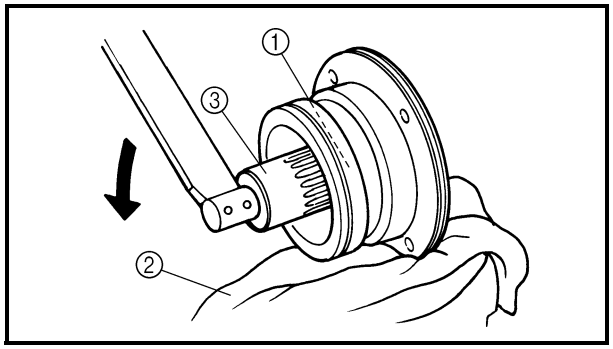
Hundredths	Round value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thickness.

Middle drive pinion gear shim	
Thickness (mm)	0.10 0.40 0.15 0.50 0.20 0.60 0.30







INSTALLING THE MIDDLE DRIVEN SHAFT

1. Install:
   - bearing retainer ①

Bearing retainer
80 Nm (8.0 m · kg, 58 ft · lb)
LOCTITE®

NOTE:

Attach the ring nut wrench ②.

Ring nut wrench
P/N. YM-38404, 90890-01430

CAUTION:

The middle driven shaft bearing retainer has left-handed threads. To tighten the retainer, turn it counterclockwise.

2. Install:
   - bearing retainer ①

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a. Place a rag ② in the vise.
b. Secure the bearing housing edge in the vise.
c. Attach the bearing retainer wrench ③.

Bearing retainer wrench
P/N. YM-04128, 90890-04128

d. Tighten the bearing retainer.

CAUTION:

The middle driven shaft bearing retainer has left-handed threads. To tighten the retainer, turn it counterclockwise.

Bearing retainer
110 Nm (11.0 m · kg, 80 ft · lb)
LOCTITE®

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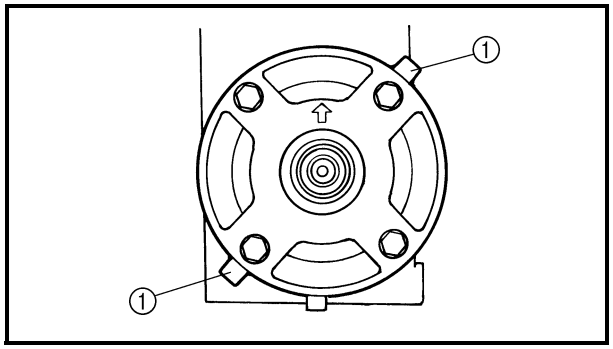
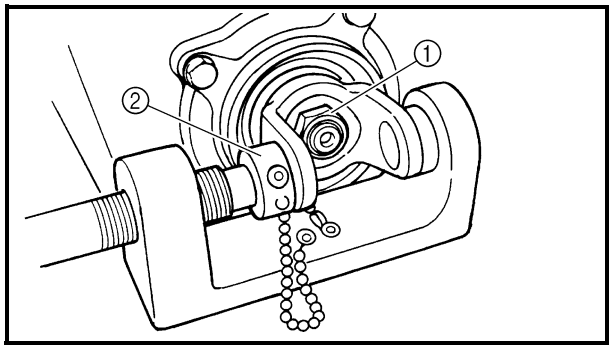


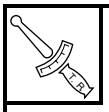
3. Install:
   - shims ①
   - bearing housing

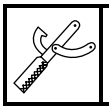
NOTE:
Install the shims so that the tabs are positioned as shown in the illustration.

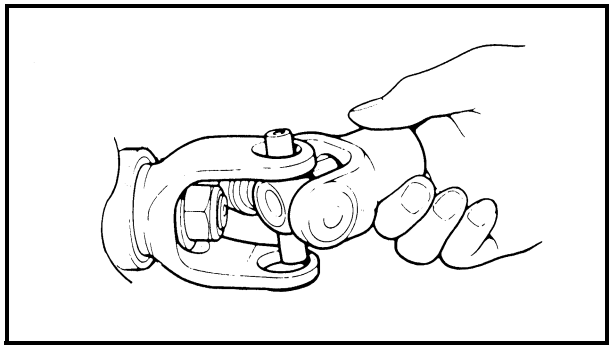


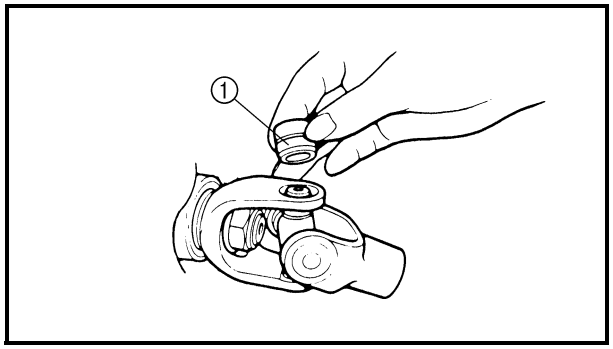
4. Install:
   - universal joint yoke
   - washer
   - nut ①

NOTE:
Use the universal joint holder ② to hold the yoke.

	**Universal joint yoke nut** **150 Nm (15.0 m · kg, 110 ft · lb)** **LOCTITE®**

	**Universal joint holder** **P/N. YM-04062, 90890-04062**





5. Install:
   - universal joint

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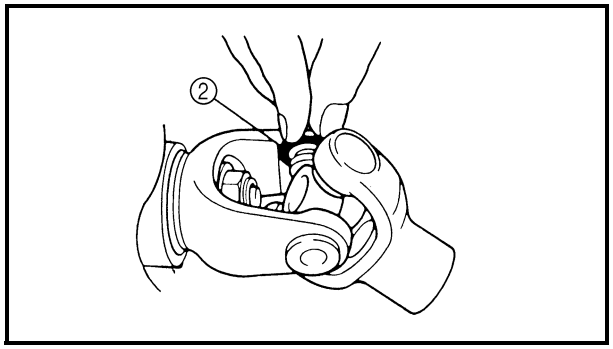
a. Install the opposite yoke into the universal joint.
b. Apply wheel bearing grease to the bearings.
c. Install the bearing ① onto the yoke.

CAUTION:
Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of place.



d. Press each bearing into the universal joint using a suitable socket.

NOTE:
The bearing must be inserted far enough into the universal joint so that the circlip can be installed.

e. Install the circlips ② into the groove of each bearing.

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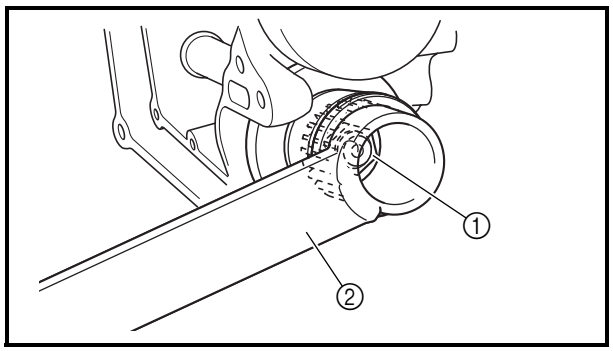
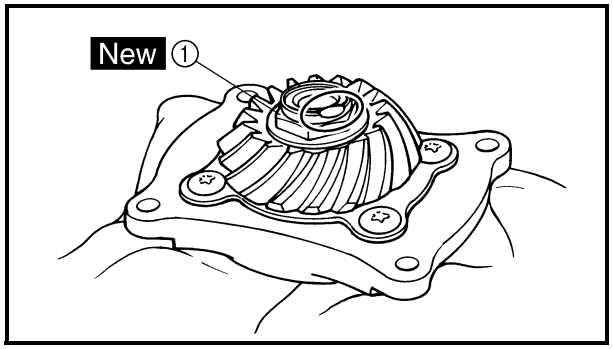


6. Install:
   - drive shaft coupling
   - washer
   - nut ① **97 Nm (9.7 m · kg, 70 ft · lb)**

NOTE:
Use the coupling gear/middle shaft tool ② to hold the drive shaft coupling.

	Coupling gear/middle shaft tool P/N. YM-01229, 90890-01229

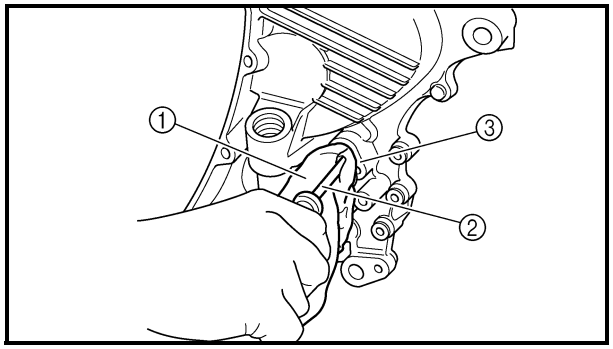


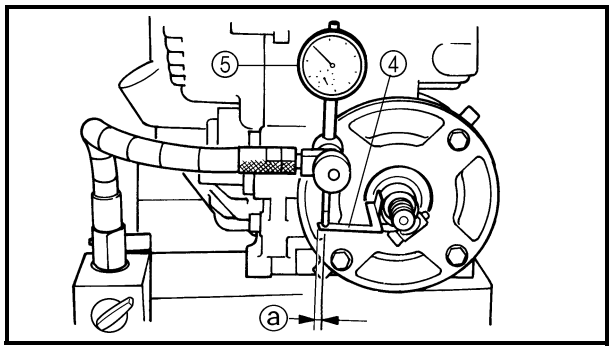
INSTALLING THE MIDDLE DRIVE SHAFT

1. Tighten:
   - middle drive pinion gear nut ① New **145 Nm (14.5 m · kg, 105 ft · lb)**

NOTE:
Secure the middle drive shaft in the vise with a clean rag.

2. Lock the threads with a drift punch.





MEASURING THE MIDDLE GEAR BACKLASH

1. Measure:
   • gear lash

Middle gear lash
0.1 ~ 0.3 mm (0.004 ~ 0.012 in)

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a. Temporary install the left crankcase.
b. Wrap a rag ① around a screwdriver ②, and then insert it into the installation hole ③ of the right crankcase speed sensor to hold the middle driven gear.
c. Attach the gear lash measurement tool ④ and dial gauge ⑤.

Gear lash measurement tool
P/N. YM-01467, 90890-01467

ⓐ 6.7 mm (0.26 in)

d. Measure the gear lash while rotating the middle driven shaft back and forth.

NOTE:

Measure the gear lash at 4 positions. Rotate the middle driven gear 90° each time.

e. If the gear lash is incorrect, adjust the gear lash by middle driven pinion gear shims and/or middle drive pinion gear shim(s).

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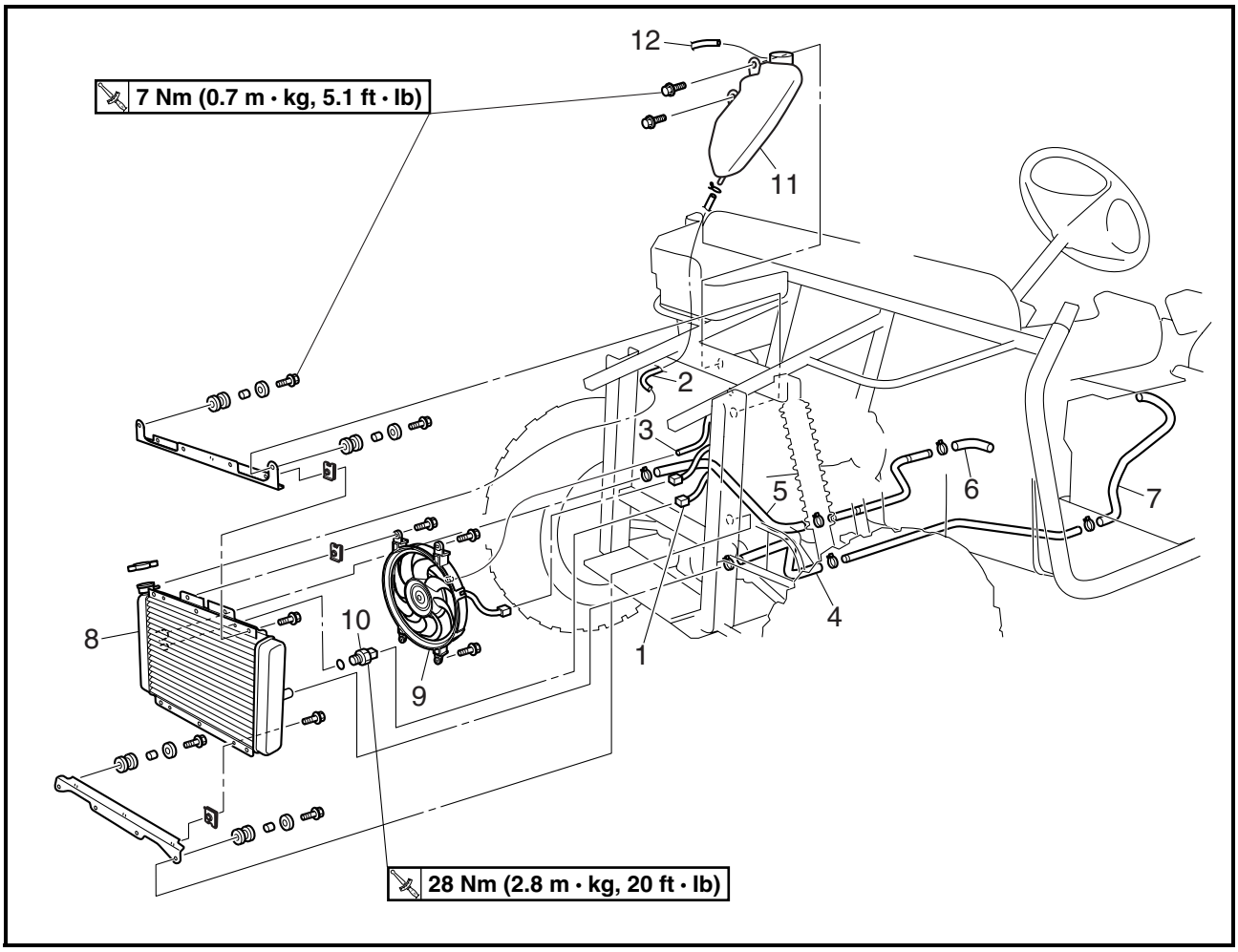
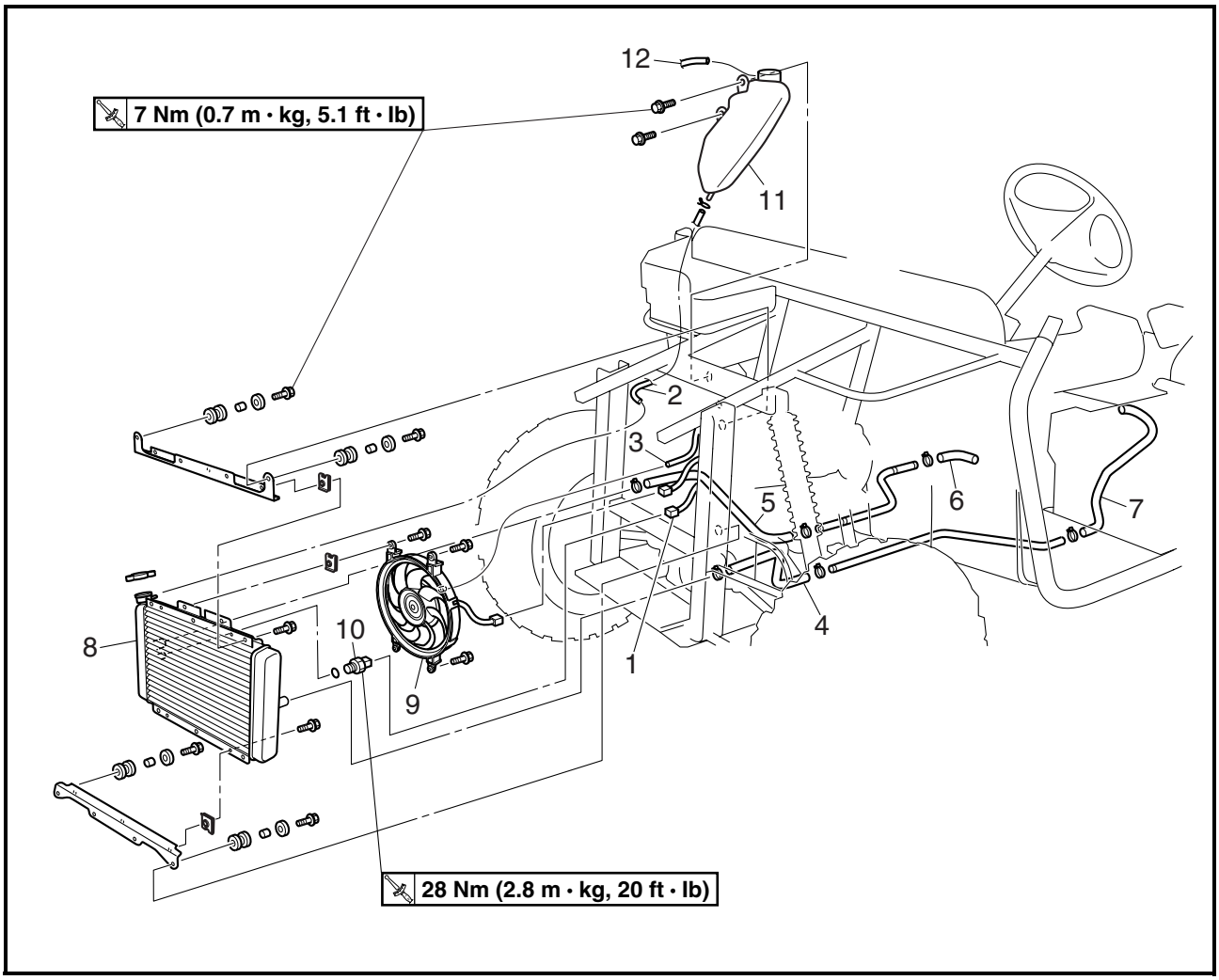
COOLING SYSTEM

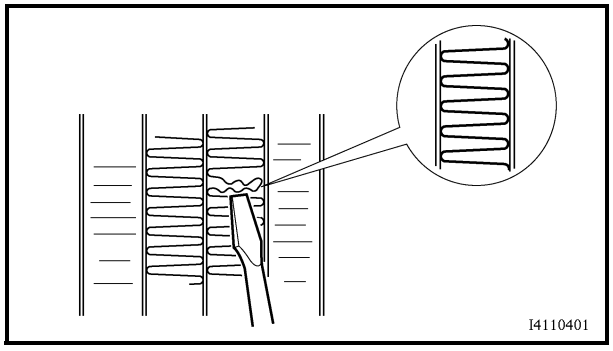
RADIATOR AND COOLANT RESERVOIR



Order	Job/Part	Q'ty	Remarks
	Removing the radiator		Remove the parts in the order listed.
	Oil cooler		Refer to "OIL COOLER".
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Thermo switch 3 coupler	1	Disconnect.
2	Coolant reservoir hose	1	Disconnect.
3	Radiator fan breather hose	1	Disconnect.
4	Radiator inlet hose	1	
5	Radiator outlet hose	1	
6	Water pump inlet hose	1	
7	Coolant outlet hose	1	
8	Radiator	1	
9	Radiator fan	1	
10	Thermo switch 3	1	



Order	Job/Part	Q'ty	Remarks
11	Coolant reservoir	1	
12	Coolant reservoir breather hose	1	Disconnect. For installation, reverse the removal procedure.

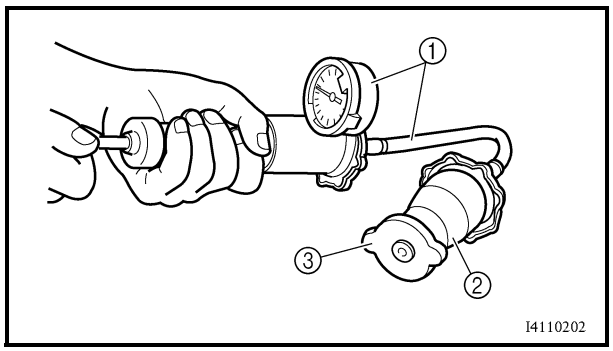


CHECKING THE RADIATOR

1. Check:
   - radiator fins
     Obstruction → Clean.
     Apply compressed air to the rear of the radiator.
     Damage → Repair or replace.

NOTE:
Straighten any flattened fins with a thin, flat-head screwdriver.

2. Check:
   - radiator hoses
     Cracks/damage → Replace.



3. Measure:
   - radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.

Radiator cap opening pressure
107.9 ~ 137.3 kPa
(1.079 ~ 1.373 kg/cm², 15.35 ~ 19.53 psi)

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a. Install the radiator cap tester ① and adapter ② onto the radiator cap ③.

Radiator cap tester
P/N. YU-24460-01, 90890-01325
Radiator cap tester adapter
P/N. YU-33984, 90890-01352

b. Apply the specified pressure for ten seconds and make sure that there is no drop in pressure.

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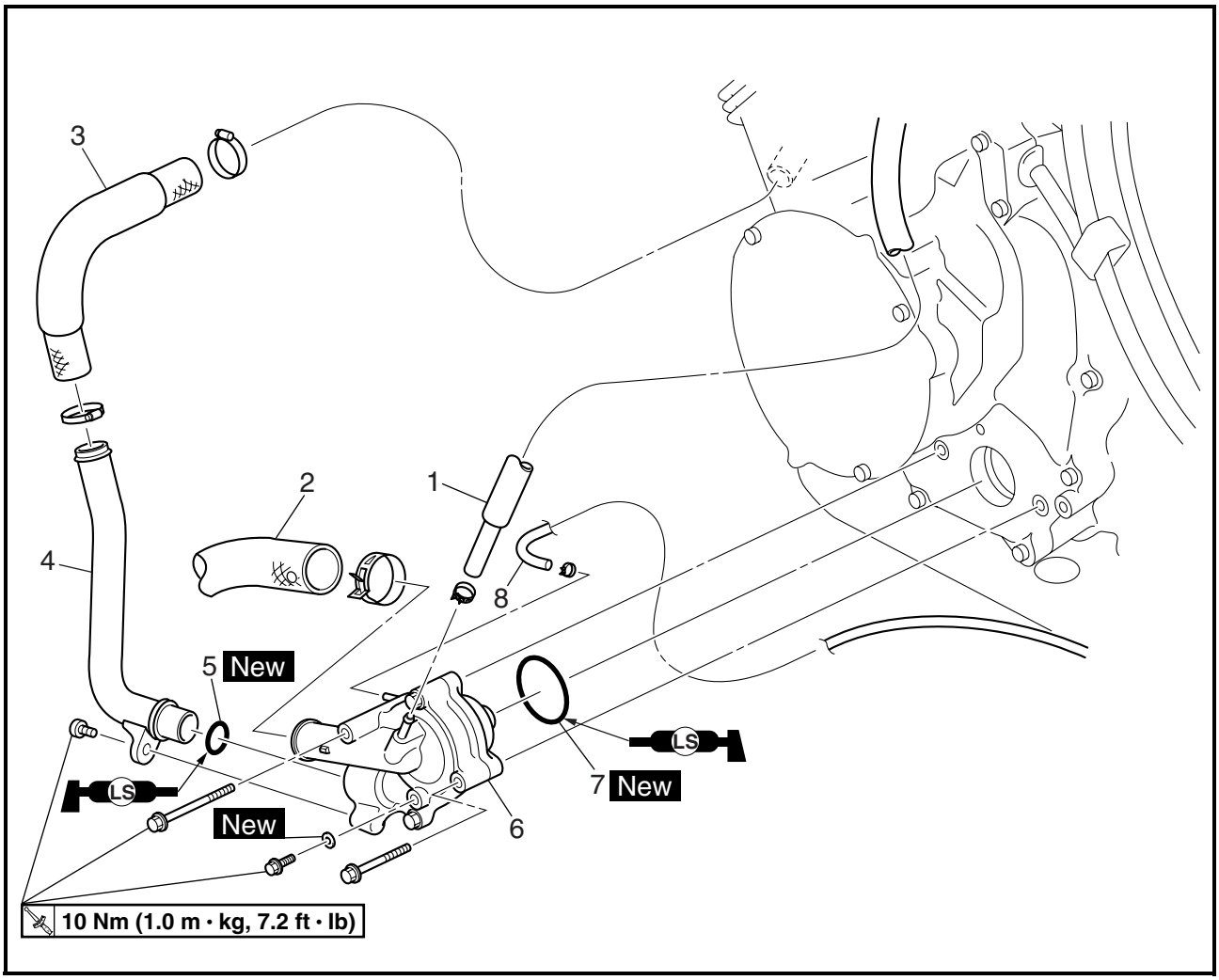
4. Check:
   - radiator fan
     Damage → Replace.
     Malfunction → Check and repair.
     Refer to “COOLING SYSTEM” in chapter 9.

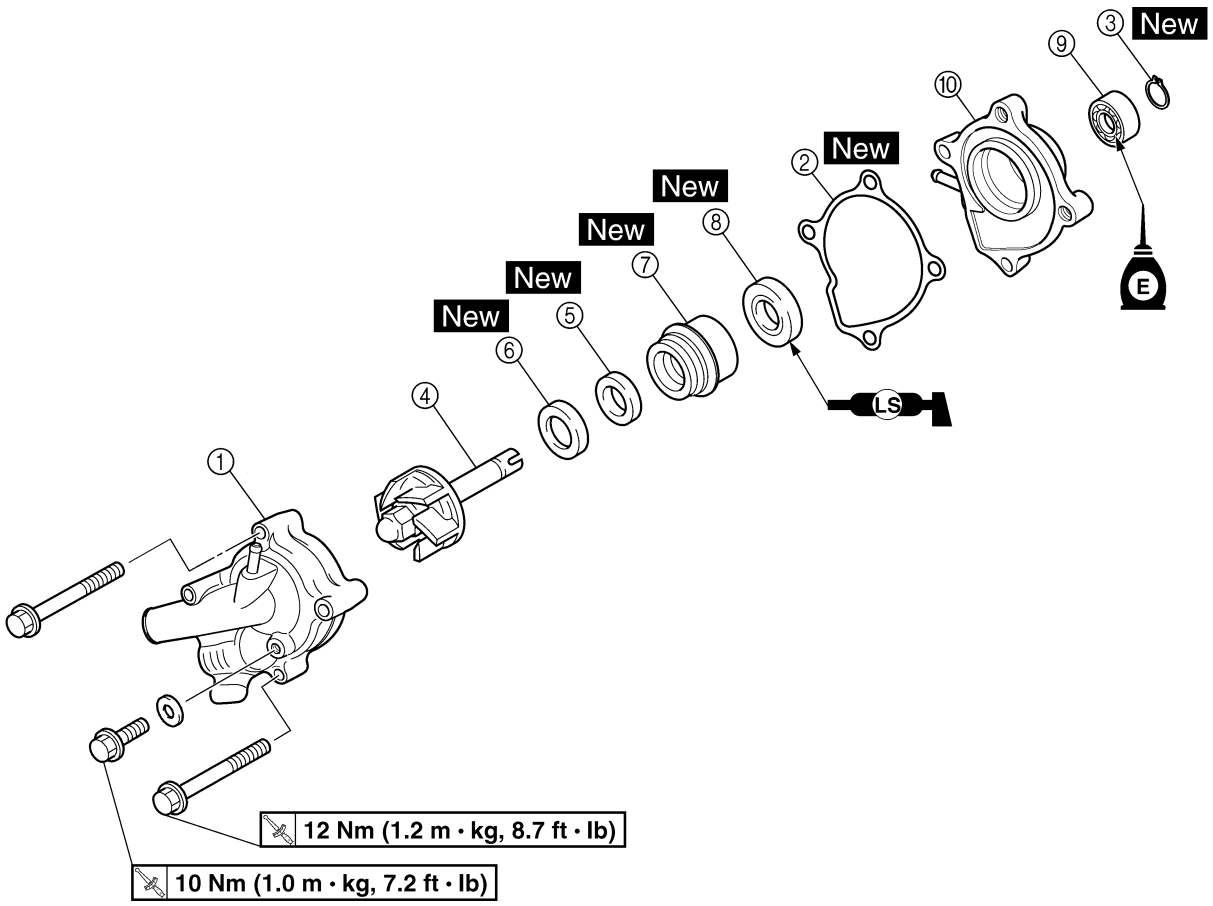
INSTALLING THE RADIATOR

1. Fill:
   - cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” in chapter 3.
2. Check:
   - cooling system
     Leaks → Repair or replace any faulty part.

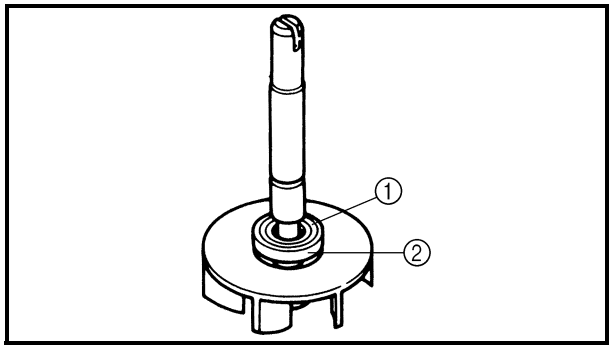
WATER PUMP



Order	Job/Part	Q'ty	Remarks
	Removing the water pump		Remove the parts in the order listed.
	Driver seat/passenger seat/console		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
1	Coolant outlet joint breather hose	1	
2	Water pump inlet hose	1	
3	Water pump outlet hose	1	
4	Water pump outlet pipe	1	
5	O-ring	1	
6	Water pump assembly	1	
7	O-ring	1	
8	Water pump breather hose	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the water pump		Remove the parts in the order listed.
①	Water pump housing cover	1	
②	Gasket	1	
③	Circlip	1	
④	Impeller	1	
⑤	Rubber damper holder	1	
⑥	Rubber damper	1	
⑦	Water pump seal	1	
⑧	Oil seal	1	
⑨	Bearing	1	
⑩	Water pump housing	1	
			For assembly, reverse the disassembly procedure.

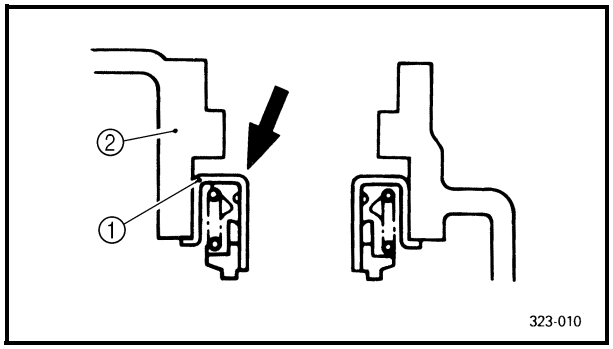


DISASSEMBLING THE WATER PUMP

1. Remove:
   - rubber damper holder ①
   - rubber damper ②
     (from the impeller, with a thin, flathead screwdriver)

NOTE:

Do not scratch the impeller shaft.

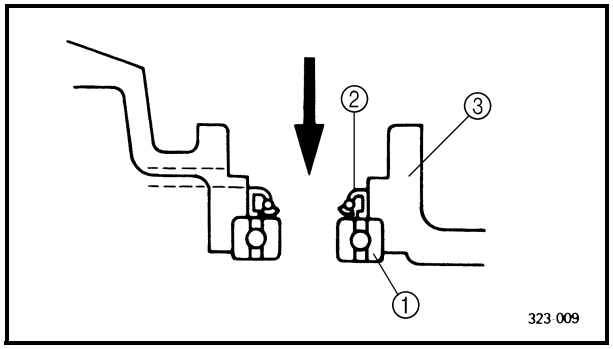


2. Remove:
   - water pump seal ①

NOTE:

Tap out the water pump seal from the inside of the water pump housing.

② Water pump housing

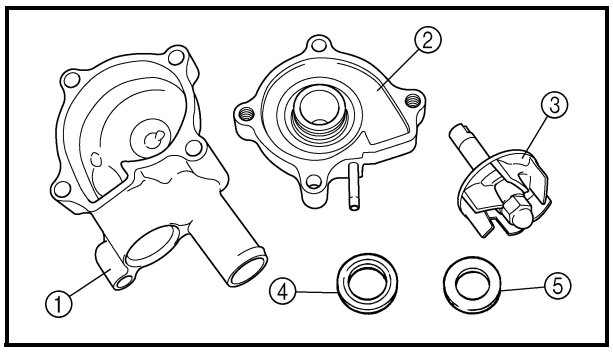


3. Remove:
   - bearing ①
   - oil seal ②

NOTE:

Tap out the bearing and oil seal from the outside of the water pump housing.

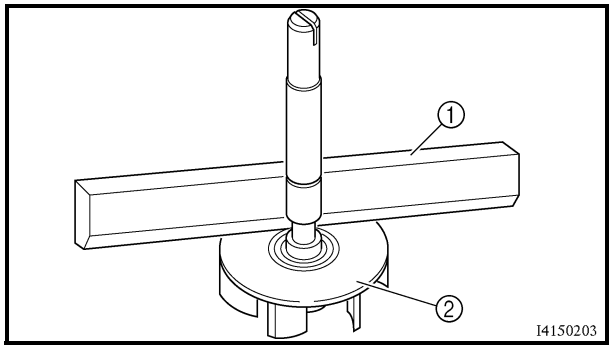
③ Water pump housing



CHECKING THE WATER PUMP

1. Check:
   - water pump housing cover ①
   - water pump housing ②
   - impeller ③
   - rubber damper ④
   - rubber damper holder ⑤
     Cracks/damage/wear → Replace.

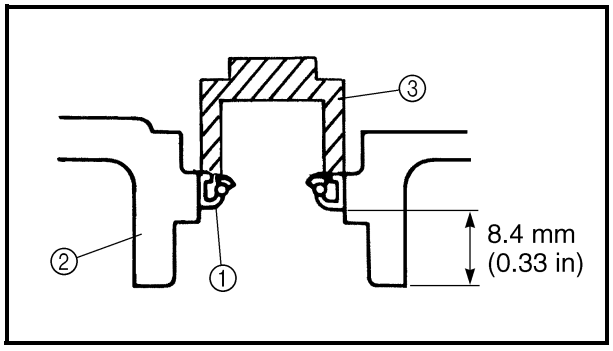
2. Check:
   - water pump seal
   - oil seal
   - water pump outlet pipe
     Cracks/damage/wear → Replace.
   - bearing
     Rough movement → Replace.



3. Measure:
   • impeller shaft tilt
   Out of specification → Replace.

Max. impeller shaft tilt
0.15 mm (0.006 in)

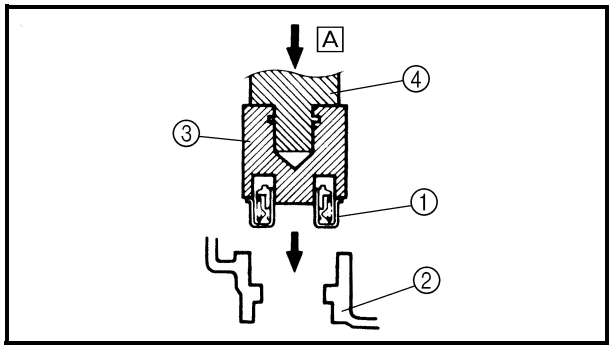
① Straightedge
② Impeller



ASSEMBLING THE WATER PUMP

1. Install:
   • oil seal ① New
   (into the water pump housing ②)

NOTE:
- Before installing the oil seal, apply tap water or coolant onto its outer surface.
- Install the oil seal with a socket ③ that matches its outside diameter.



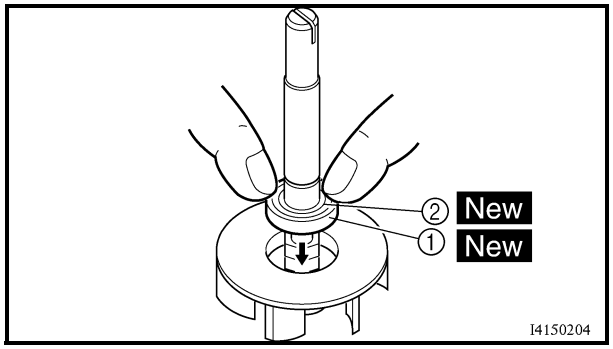
2. Install:
   • water pump seal ① New
   (into the water pump housing ②)

CAUTION:
Never lubricate the water pump seal surface with oil or grease.

NOTE:
Install the water pump seal with the special tools.

Water pump seal installer ③
P/N. YM-33221
Mechanical seal installer ③
P/N. 90890-04078
Middle driven shaft bearing driver ④
P/N. YM-04058-1, 90890-04058

A Push down.



3. Install:
   - rubber damper ① New
   - rubber damper holder ② New

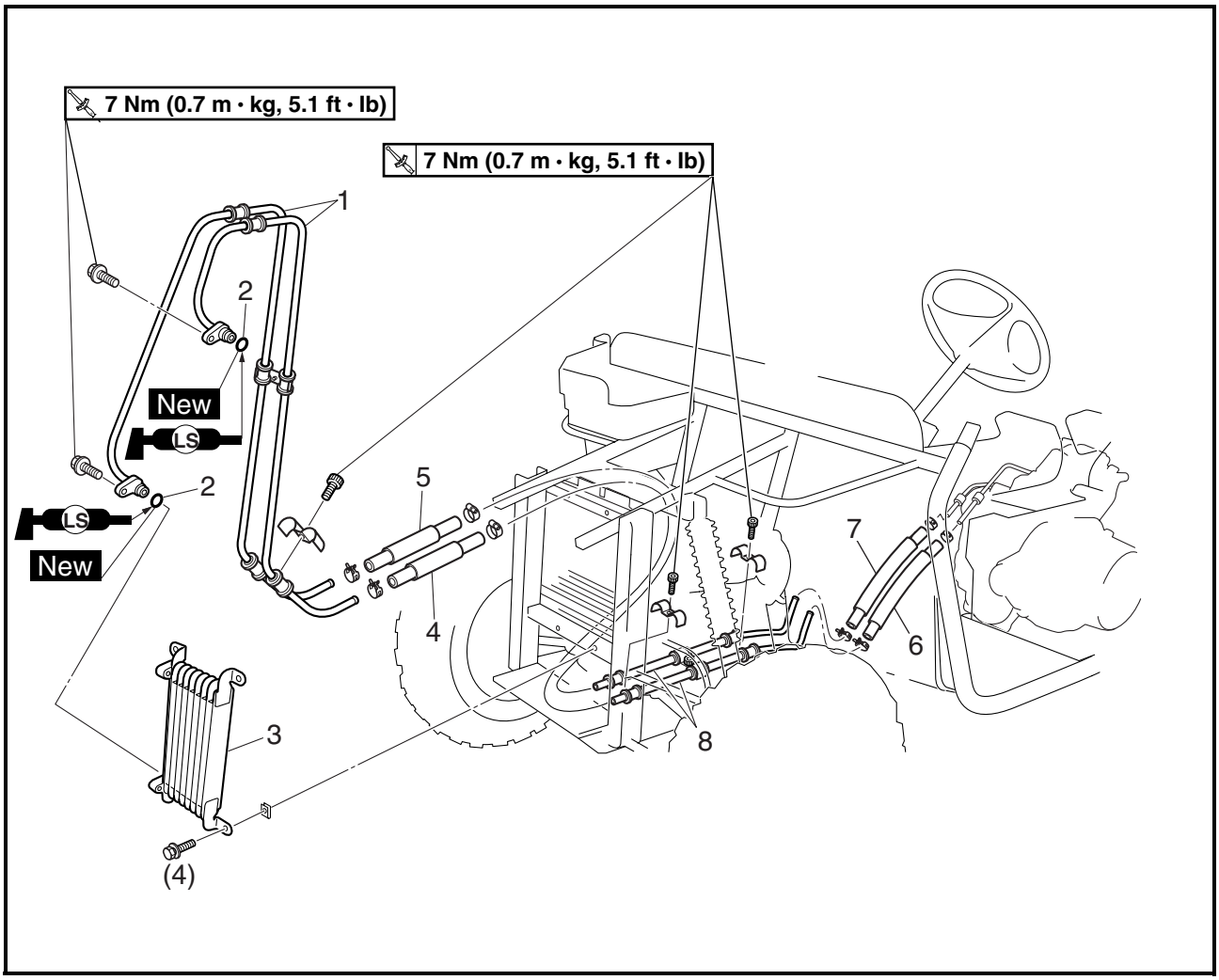
NOTE:

Before installing the rubber damper, apply tap water or coolant onto its outer surface.

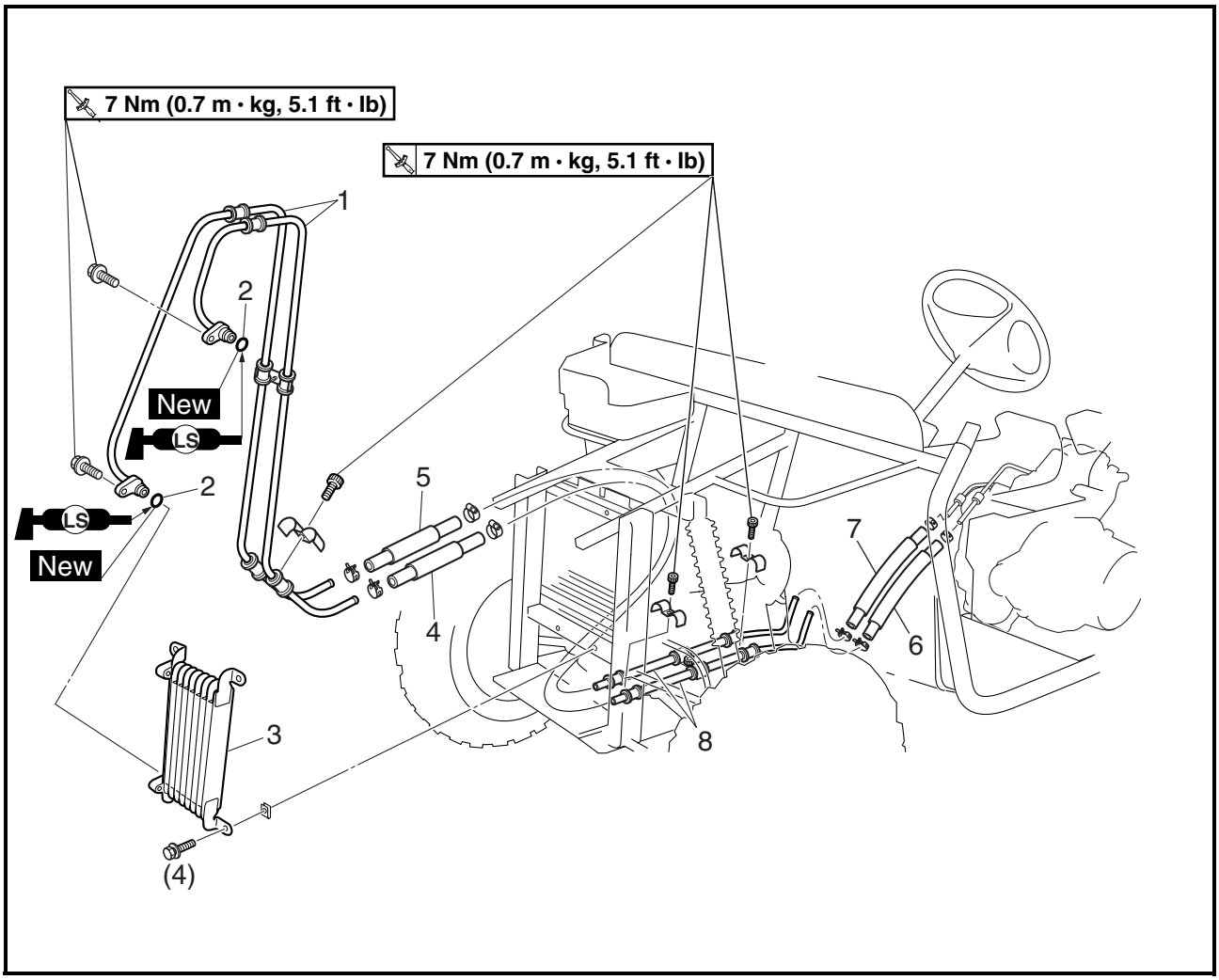
CAUTION:

Make sure that the rubber damper and rubber damper holder are flush with the impeller.

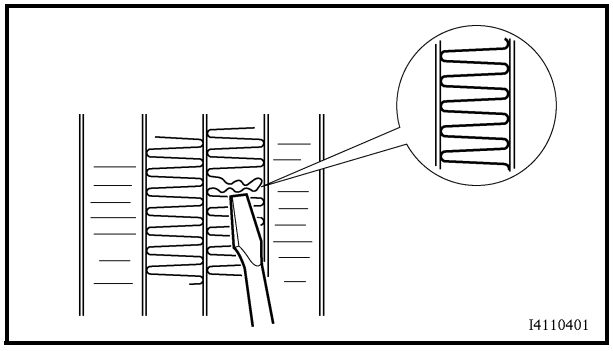
OIL COOLER



Order	Job/Part	Q'ty	Remarks
	Removing the oil cooler		Remove the parts in the order listed.
	Driver seat/passenger seat/console/left support side panel/right support side panel/footrest cover		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Oil cooler inlet pipe 1/oil cooler outlet pipe 1	1/1	
2	O-ring	2	
3	Oil cooler	1	
4	Oil cooler inlet hose	1	
5	Oil cooler outlet hose	1	
6	Oil outlet hose	1	
7	Oil inlet hose	1	



Order	Job/Part	Q'ty	Remarks
8	Oil cooler inlet pipe 2/oil cooler outlet pipe 2	1/1	For installation, reverse the removal procedure.



CHECKING THE OIL COOLER

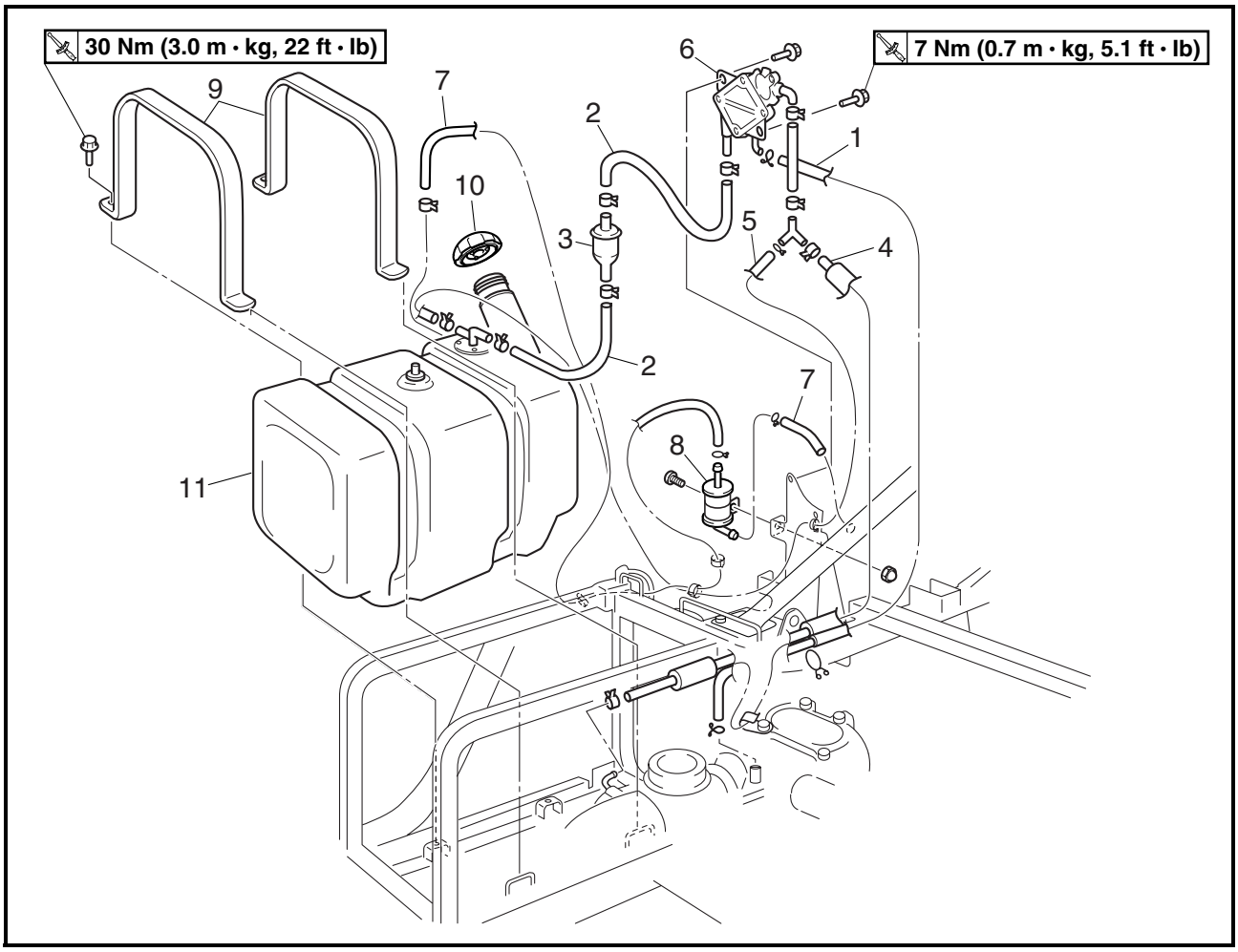
1. Check:
   - oil cooler
     Obstruction → Clean.
     Apply compressed air to the rear of the oil cooler.
     Damage → Repair or replace the oil cooler.

NOTE:
Straighten any flattened fins with a thin, flat-head screwdriver.

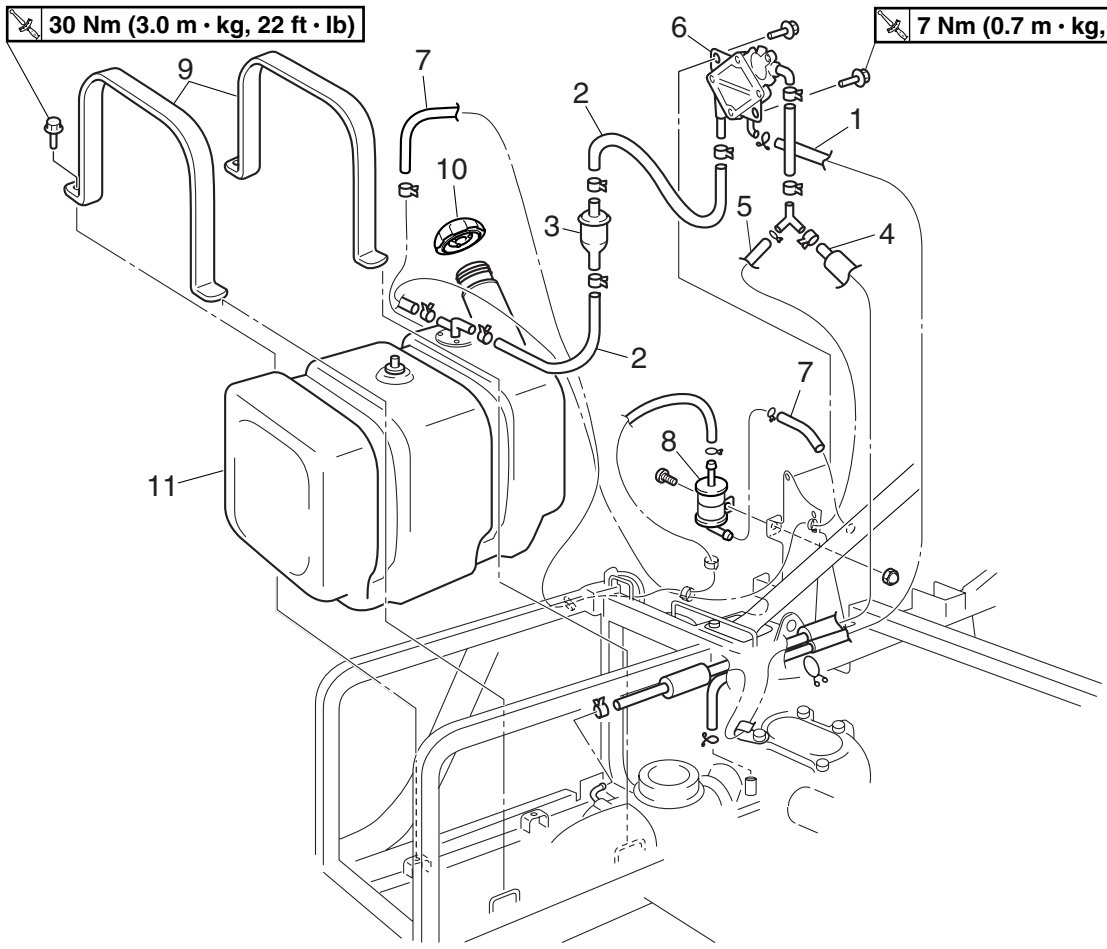
2. Check:
   - oil hoses
     Cracks/damage → Replace.

FUEL SYSTEM

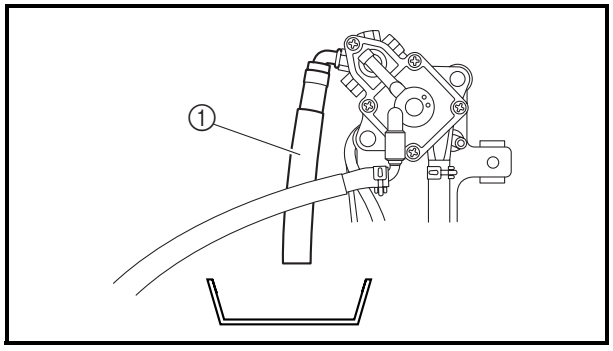
FUEL PUMP AND FUEL TANK



Order	Job/Part	Q'ty	Remarks
	Removing the fuel pump and fuel tank		Remove the parts in the order listed.
	Driver seat/passenger seat/console/ right side panel/right support side panel/right protector/right seat support		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
1	Vacuum hose	1	
2	Fuel hose	2	
3	Fuel filter	1	
4	Fuel suction hose	1	
5	Fuel return hose	1	
6	Fuel pump	1	
7	Fuel tank breather hose	2	
8	Rollover valve	1	
9	Fuel tank stay	2	



Order	Job/Part	Q'ty	Remarks
10	Fuel tank cap	1	
11	Fuel tank	1	For installation, reverse the removal procedure.



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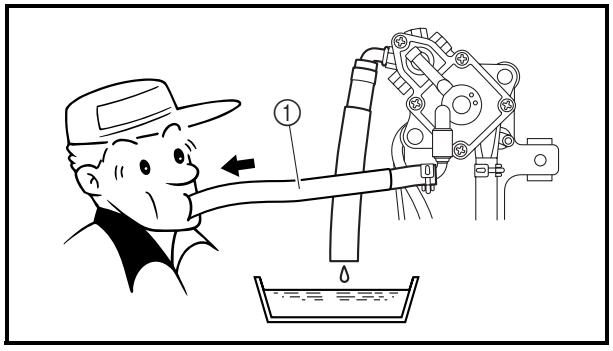
CHECKING THE FUEL PUMP OPERATION

1. Remove:
   - driver seat
   - passenger seat
   - console
   - right protector

   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
2. Place a container under the end of the fuel hose ①.



3. Check:
   - fuel pump operation

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a. Suck on the end of the vacuum hose ①.

Fuel flows.	**Fuel pump is OK.**
Fuel does not flow.	**Replace the fuel pump.**

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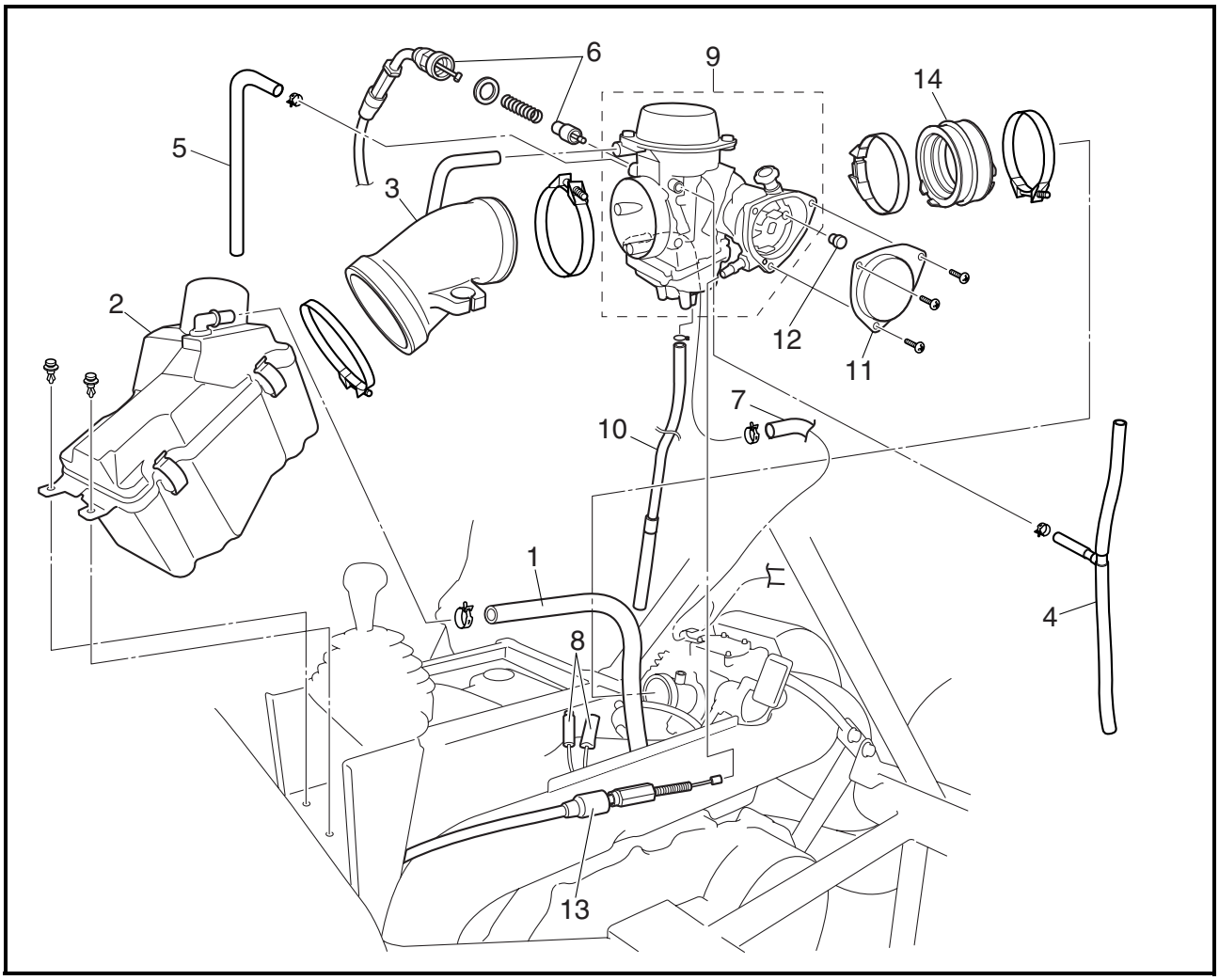
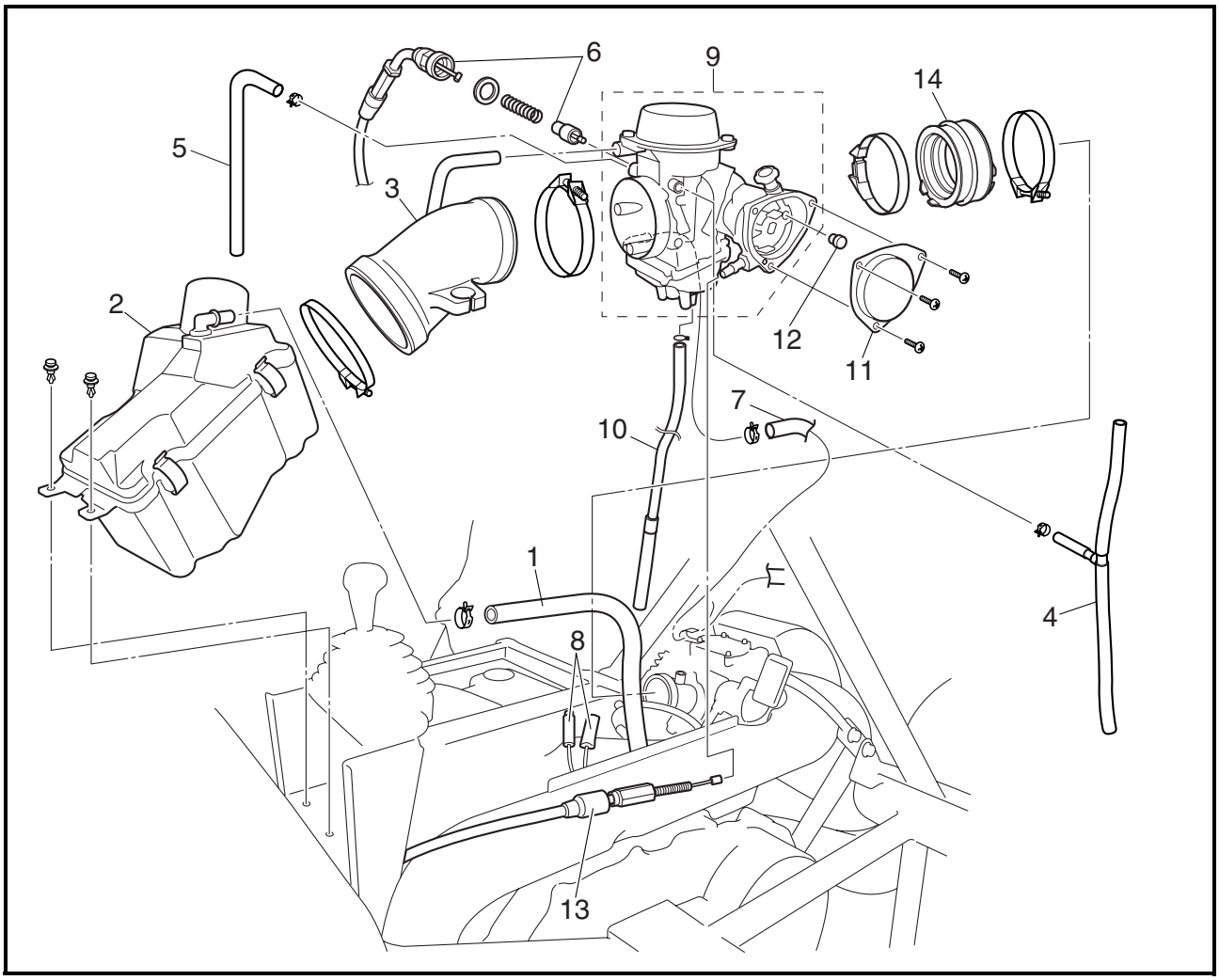
4. Install:
   - right protector
   - console
   - passenger seat
   - driver seat

   Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.

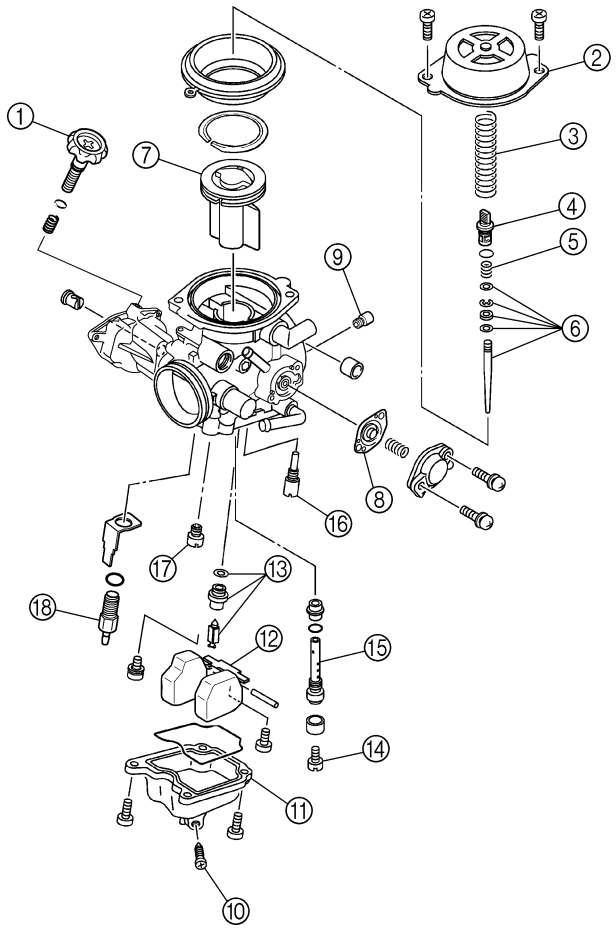
CARBURETOR



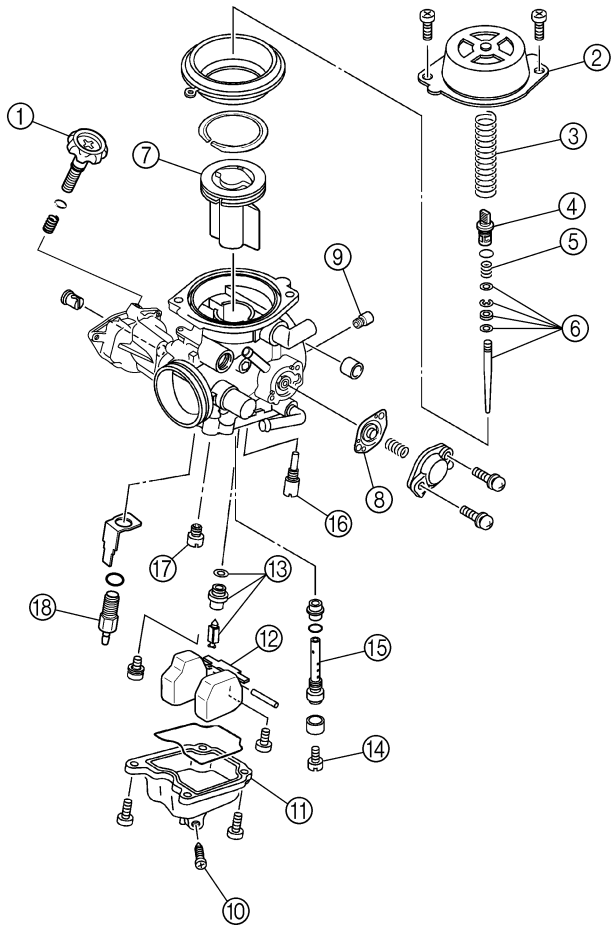
Order	Job/Part	Q'ty	Remarks
	Removing the carburetor		Remove the parts in the order listed.
	Driver seat/passenger seat/console	1	Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
1	Crankcase breather hose	1	Disconnect.
2	Air filter case	1	
3	Carburetor joint (air filter case)	1	
4	Vacuum chamber breather hose	1	
5	Air vent hose	1	
6	Starter cable/starter plunger	1/1	
7	Fuel hose	1	Disconnect.
8	Carburetor heater lead	2	Disconnect.
9	Carburetor assembly	1	
10	Drain hose	1	
11	Throttle valve cover	1	



Order	Job/Part	Q'ty	Remarks
12	Throttle cable end	1	
13	Throttle cable	1	
14	Carburetor joint (intake manifold)	1	
			For installation, reverse the removal procedure.



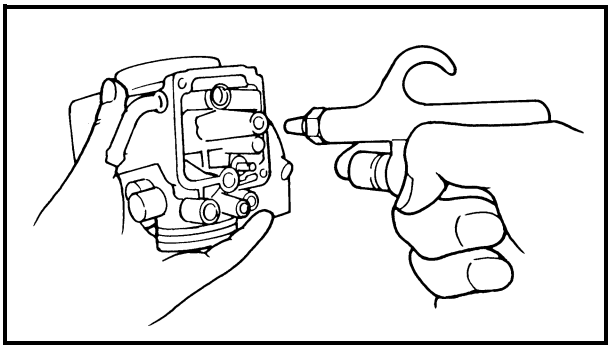
Order	Job/Part	Q'ty	Remarks
	Disassembling the carburetor		Remove the parts in the order listed. **NOTE:** Before disassembling the carburetor, make sure to note the number of times the pilot screw is turned out from the seated position to its set position.
①	Throttle stop screw	1	
②	Vacuum chamber cover	1	
③	Spring	1	
④	Jet needle holder	1	
⑤	Spring	1	
⑥	Jet needle set	1	
⑦	Piston valve	1	
⑧	Coasting enricher diaphragm	1	



Order	Job/Part	Q'ty	Remarks
⑨	Pilot air jet	1	
⑩	Drain screw	1	
⑪	Float chamber	1	
⑫	Float	1	Refer to "ASSEMBLING THE CARBURETOR".
⑬	Needle valve set	1	
⑭	Main jet	1	
⑮	Needle jet	1	Refer to "ASSEMBLING THE CARBURETOR".
⑯	Pilot jet	1	
⑰	Starter jet	1	
⑱	Carburetor heater	1	
			For assembly, reverse the disassembly procedure.

DISASSEMBLING THE CARBURETOR

NOTE:
Before disassembling the carburetor, make sure to note the number of times the pilot screw is turned out from the seated position to its set position.



CHECKING THE CARBURETOR

1. Check:
   - carburetor body
   - float chamber
     Cracks/damage → Replace.
   - fuel passage
     Contamination → Clean as indicated.
   - fuel chamber body
     Contamination → Clean.

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a. Wash the carburetor in a petroleum based solvent.
   (Do not use any caustic carburetor cleaning solution.)
b. Blow out all of the passages and jets with compressed air.

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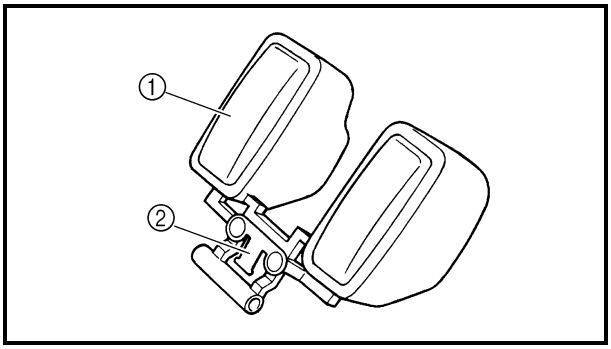
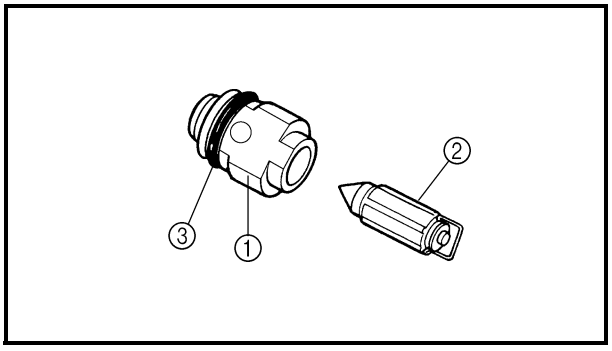
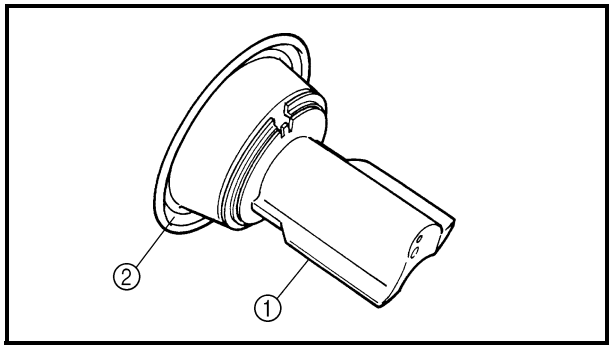


2. Check:
   - float ①
   - float tang ②
     Damage → Replace.

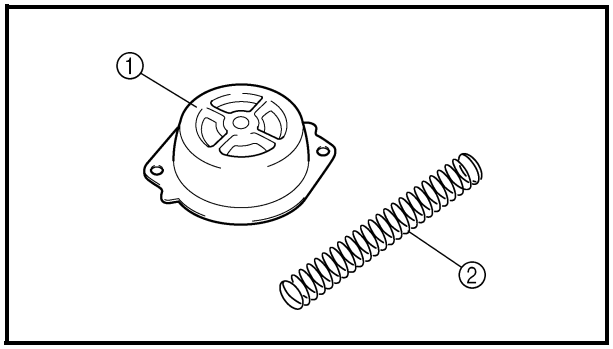


3. Check:
   - needle valve seat ①
   - needle valve ②
   - O-ring ③
     Contamination/wear/damage → Replace as a set.

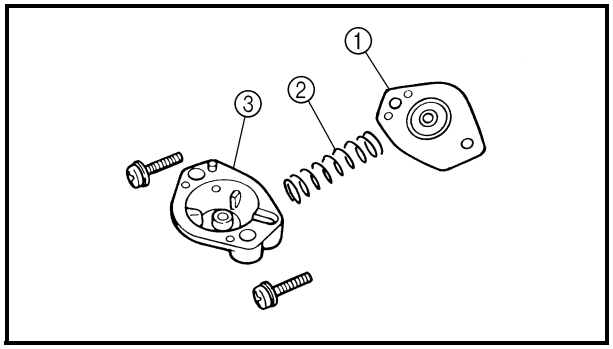
NOTE:
Always replace the needle valve and valve seat as a set.



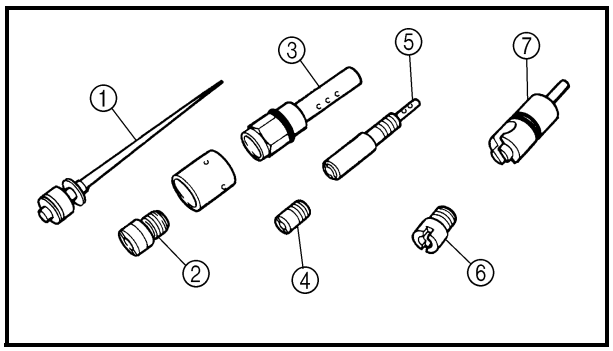
4. Check:
   - piston valve ①
     Scratches/wear/damage → Replace.
   - rubber diaphragm ②
     Tears → Replace.



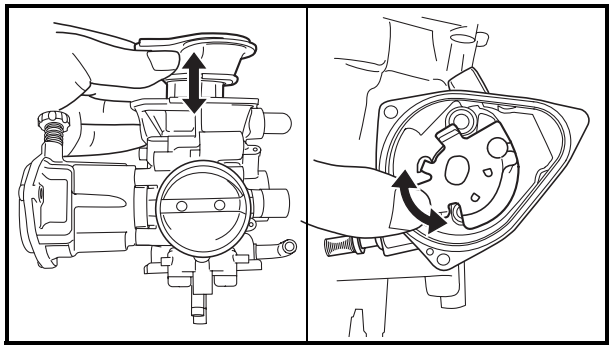
5. Check:
   - vacuum chamber cover ①
   - spring ②
     Cracks/damage → Replace.



6. Check:
   - diaphragm (coasting enricher) ①
   - spring ②
   - cover ③
     Tears (diaphragm) /damage → Replace.



7. Check:
   - jet needle ①
   - main jet ②
   - needle jet ③
   - pilot air jet ④
   - pilot jet ⑤
   - starter jet ⑥
   - starter plunger ⑦
     Bends/wear/damage → Replace.
     Blockage → Blow out the jets with compressed air.

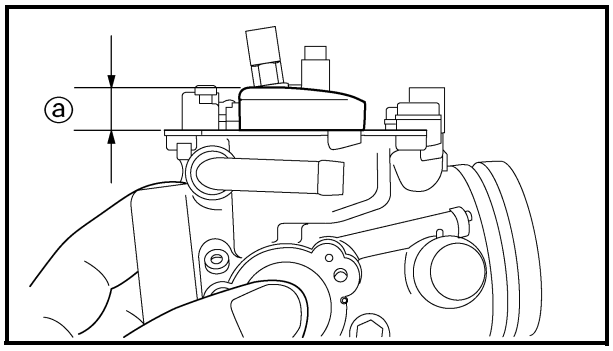


8. Check:
   - free movement (piston valve)
     Sticks → Replace the piston valve guide and the piston valve.
     Insert the piston valve into the carburetor body, and check for free movement.
9. Check:
   - free movement (throttle valve)
     Sticks → Replace.

ASSEMBLING THE CARBURETOR

NOTE:
Before assembling the carburetor, make sure to turn out the pilot screw the same number of times, as noted before disassembly, from the seated position to the set position.

CAUTION:
Before assembling, wash all of the parts in a clean petroleum based solvent.



1. Measure:
   - float height ⓐ
     Out of specification → Adjust.

	Float height (F.H.) **13 mm (0.51 in)**

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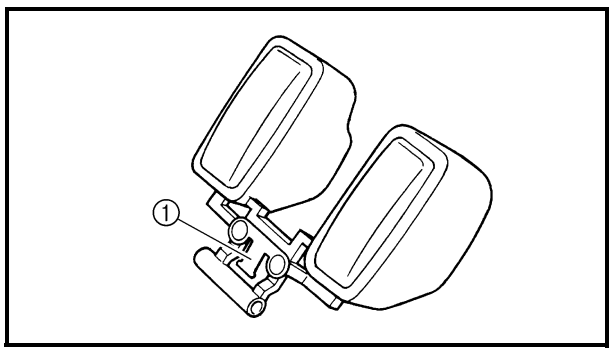
a. Hold the carburetor in an upside down position.
b. Measure the distance from the front mating surface of the float chamber (gasket removed) to the top of the float.

NOTE:
The float arm should be resting on the needle valve, but not compressing it.



c. If the float height is not within the specification, check the valve seat and needle valve.
d. If either is worn, replace them both.
e. If both are fine, adjust the float height by bending the float tang ① on the float.
f. Recheck the float height.

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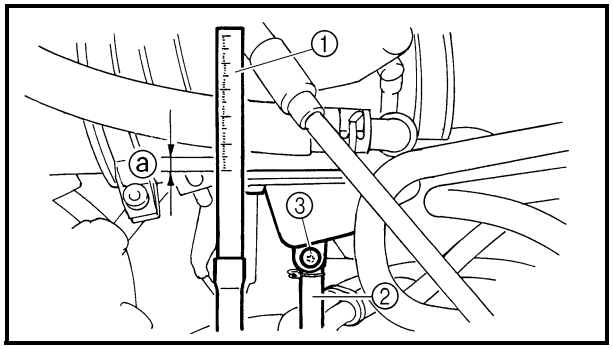

ADJUSTING THE FUEL LEVEL

1. Measure:
   - fuel level ⓐ
     Out of specification → Adjust.

Fuel level
4.0 ~ 5.0 mm (0.16 ~ 0.20 in)
Above the float chamber mating surface

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a. Place the vehicle on a level surface.
b. Connect the fuel level gauge ① to the drain pipe ②.

Fuel level gauge
P/N. YM-01312-A, 90890-01312

c. Loosen the drain screw ③.
d. Hold the gauge vertically next to the float chamber line.
e. Measure the fuel level ⓐ with the gauge.
f. If the fuel level is incorrect, adjust the fuel level.
g. Remove the carburetor.
h. Check the valve seat and needle valve.
i. If either is worn, replace them both.
j. If both are fine, adjust the float level by bending the float tang ④ slightly.
k. Install the carburetor.
l. Recheck the fuel level.

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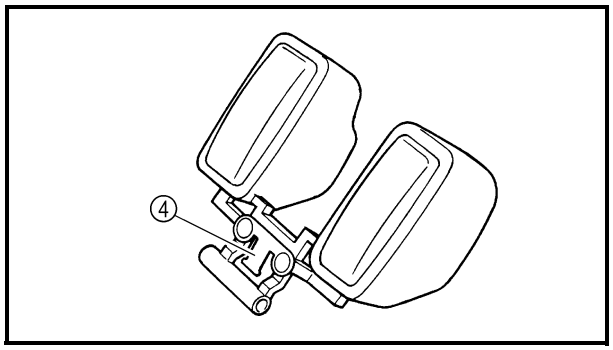

DRIVE TRAIN

TROUBLESHOOTING

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
1. A pronounced hesitation or "jerky" movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.) 2. A "rolling rumble" noticeable at low speed; a high-pitched whine; a "clunk" from a shaft drive component or area. 3. A locked-up condition of the shaft drive train mechanism, no power transmitted from the engine to the front and/or rear wheel.	A. Bearing damage. B. Improper gear lash. C. Gear tooth damage. D. Broken drive shaft. E. Broken gear teeth. F. Seizure due to lack of lubrication. G. Small foreign objects lodged between the moving parts.

NOTE:

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

Check notes

1. Investigate any unusual noises.

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The following "noises" may indicate a mechanical defect:

a. A "rolling rumble" noise during coasting, acceleration, or deceleration. The noise increases with front and/or rear wheel speed, but it does not increase with higher engine or transmission speeds.
   Diagnosis: Possible wheel bearing damage.
b. A "whining" noise that varies with acceleration and deceleration.
   Diagnosis: Possible incorrect reassembly, too-little gear lash.

CAUTION:

Too little gear lash is extremely destructive to the gear teeth. If a test ride following reassembly indicates this condition, stop riding immediately to minimize gear damage.

c. A slight “thunk” evident at low speed operation. This noise must be distinguished from normal vehicle operation.
   Diagnosis: Possible broken gear teeth.

⚠ WARNING

Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing loss of control of the vehicle and possible injury to the rider.

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2. Check:
   • drained oil
   Drained oil shows large amounts of metal particles → Check the bearing for seizure.

NOTE:

A small amount of metal particles in the oil is normal.

3. Check:
   • oil leakage

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a. Clean the entire vehicle thoroughly, then dry it.
b. Apply a leak-localizing compound or dry powder spray to the shaft drive.
c. Road test the vehicle for the distance necessary to locate the leak.
   Leakage → Check the component housing, gasket, and/or seal for damage.
   Damage → Replace the component.

NOTE:

- An apparent oil leak on a new or nearly new vehicle may be the result of a rust-preventative coating or excessive seal lubrication.
- Always clean the vehicle and recheck the suspected location of an apparent leakage.

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Troubleshooting chart

When basic condition “a” and “b” exist, check the following points:

Elevate and spin both wheels. Feel for wheel bearing damage.
- YES → Replace the wheel bearing. (Refer to “STEERING SYSTEM” and “REAR KNUCKLE AND STABILIZER” in chapter 8.)
- NO ↓

Check the wheel nuts and hub nuts for tightness.
- NO → Torque to specification. (Refer to “FRONT WHEELS AND BRAKE DISCS” and “REAR WHEELS AND BRAKE DISC” in chapter 8.)
- YES ↓

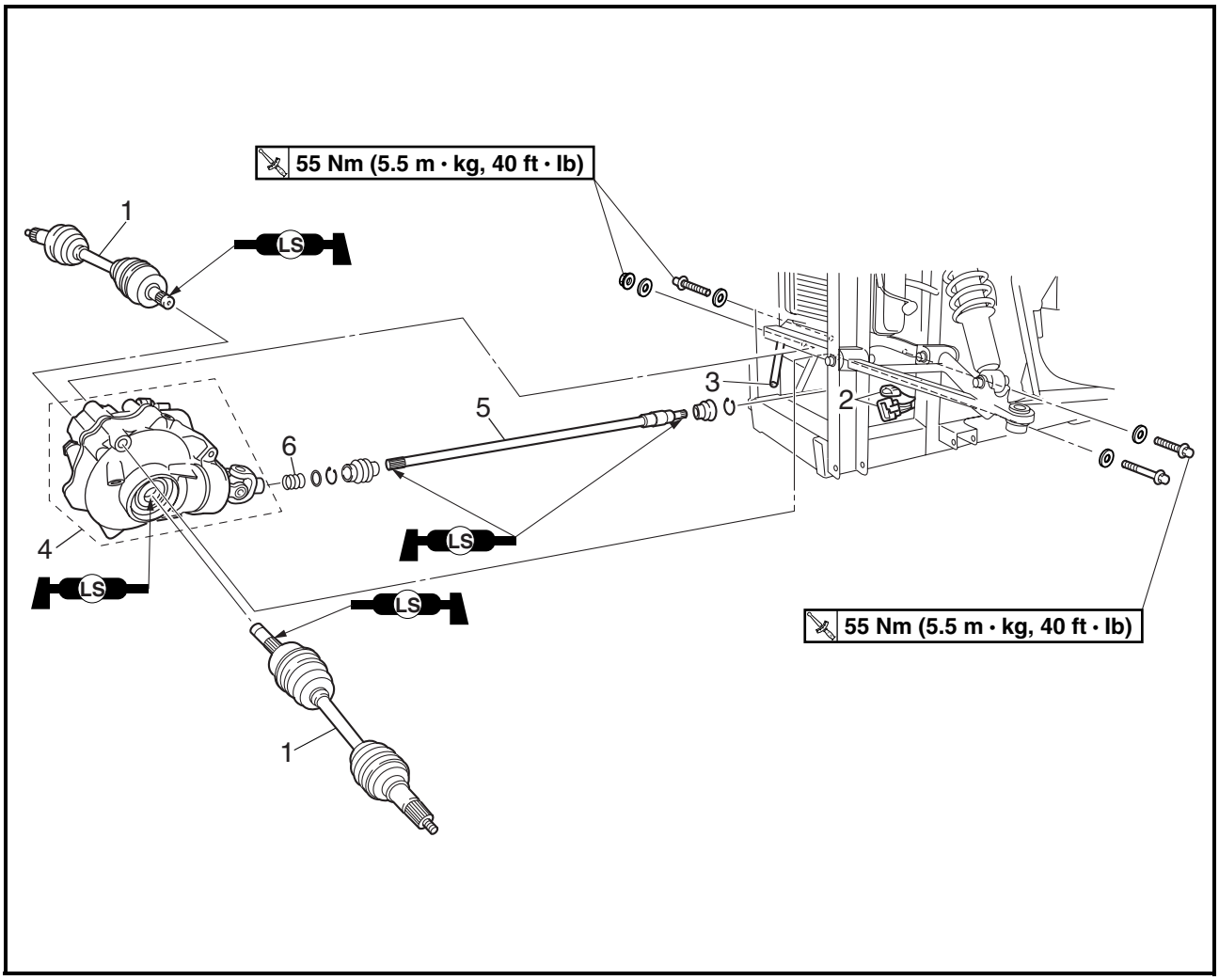
Check the front constant velocity joints. Feel for bearing damage.
- NO → Constant velocity joint bearings and differential gear bearings are probably not damaged. Repeat the test or remove the individual components.
- YES ↓

Check the parking brake adjustment.
- NO → Adjust per instructions. (Refer to “ADJUSTING THE PARKING BRAKE” in chapter 3.)
- YES ↓

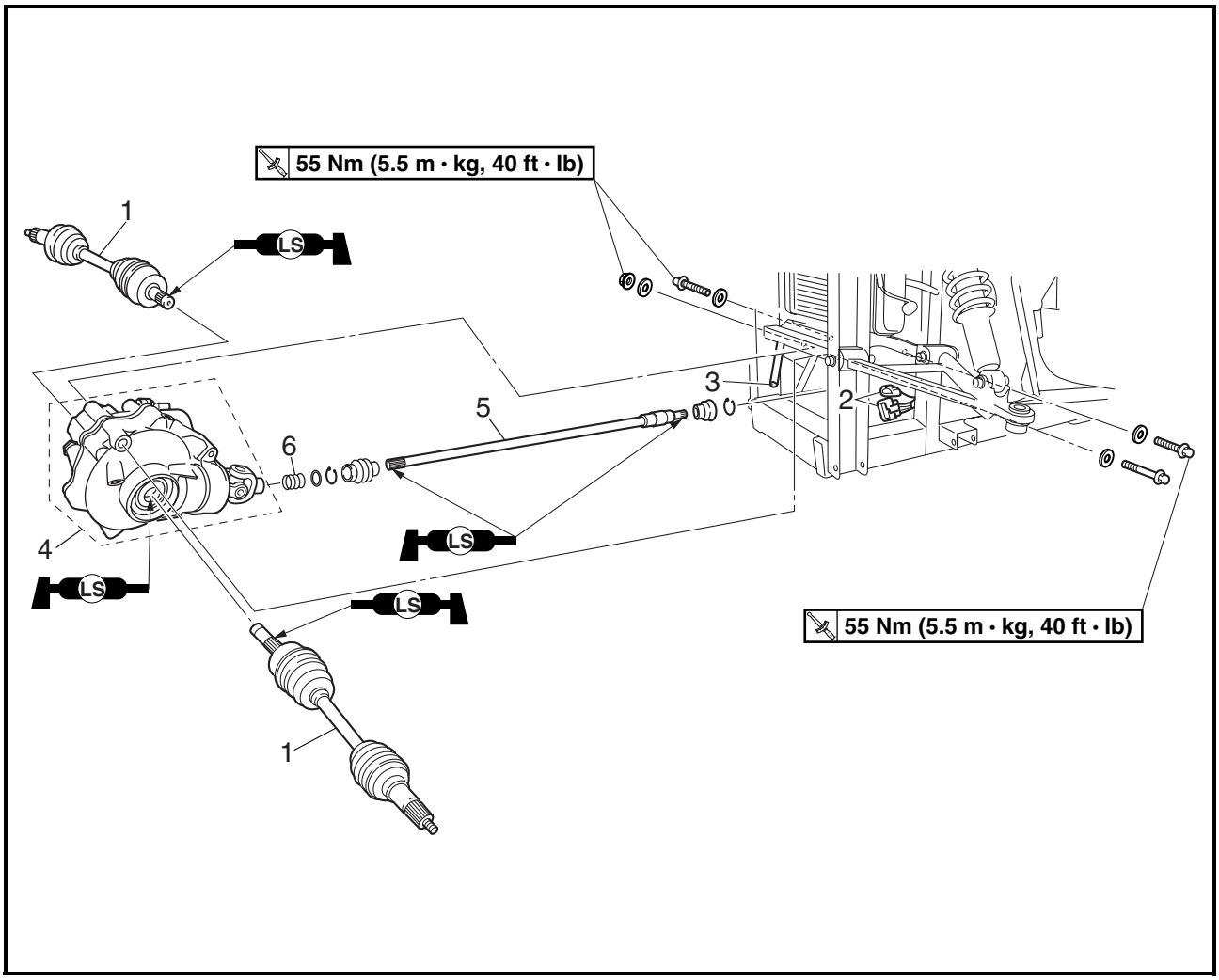
Check the rear constant velocity joints. Feel for bearing damage.
- NO → Constant velocity joint bearings and final drive gear bearings are probably not damaged. Repeat the test or remove the individual components.
- YES ↓

Remove the drive shaft components.

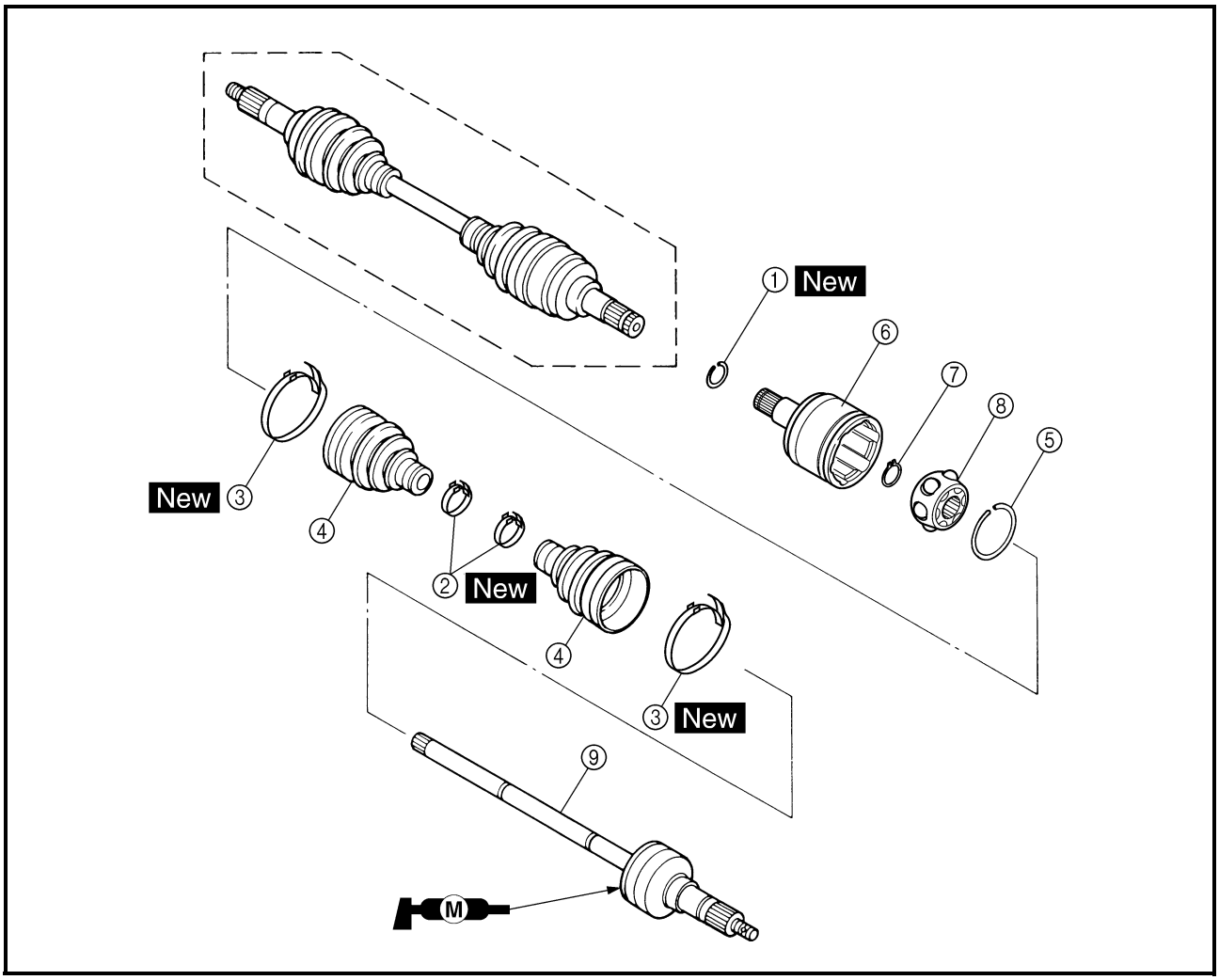
FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT



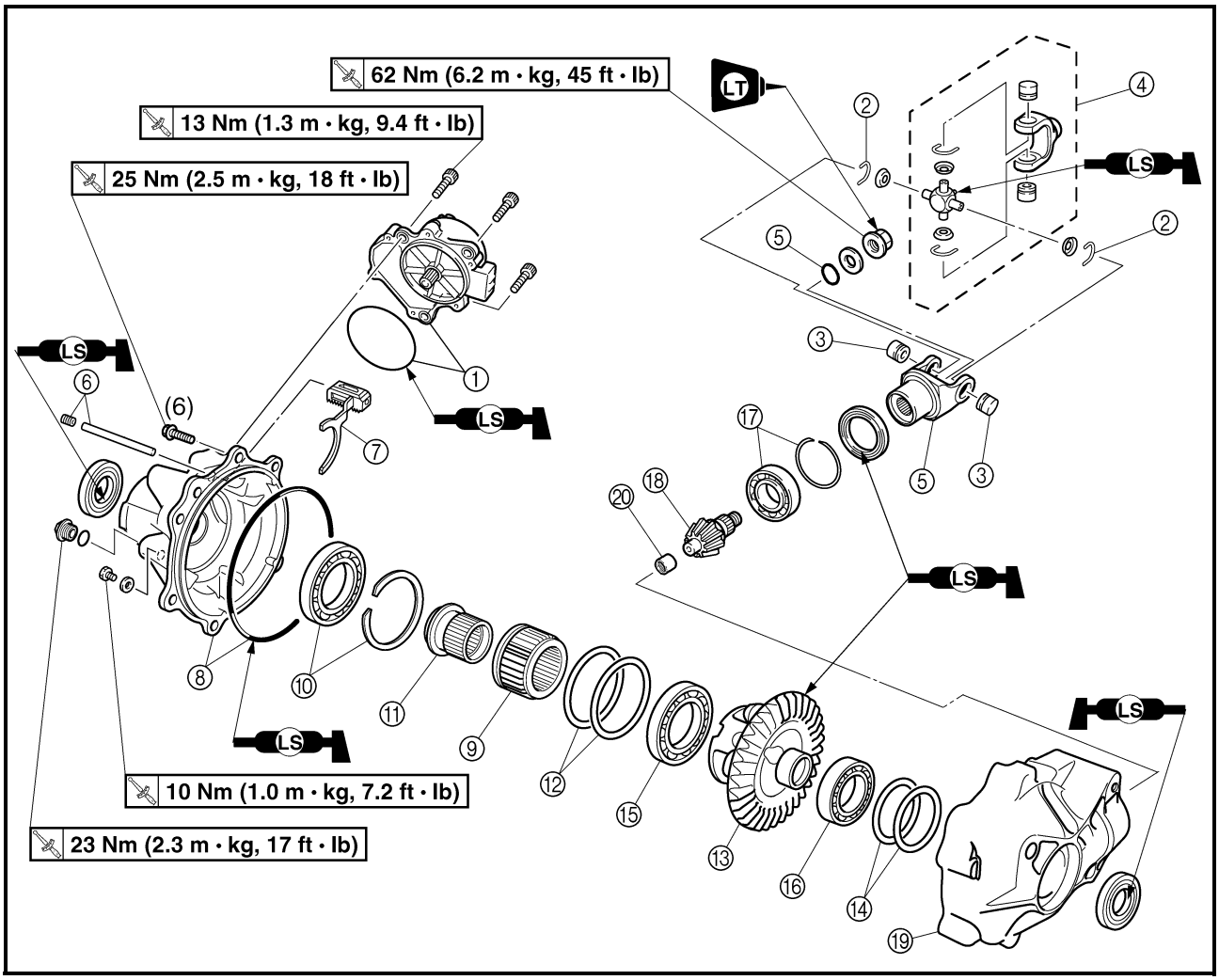
Order	Job/Part	Q'ty	Remarks
	Removing the front constant velocity joints, differential gear and drive shaft		Remove the parts in the order listed.
	Front skid plate		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
	Differential gear oil		Drain.
	Steering knuckle		Refer to "STEERING SYSTEM" in chapter 8.
	Front lower arms		Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER" in chapter 8.
1	Constant velocity joint	2	
2	Gear motor coupler/On-Command four-wheel drive switch and differential gear lock switch coupler	1/1	Disconnect.
3	Differential gear case breather hose	1	Disconnect.



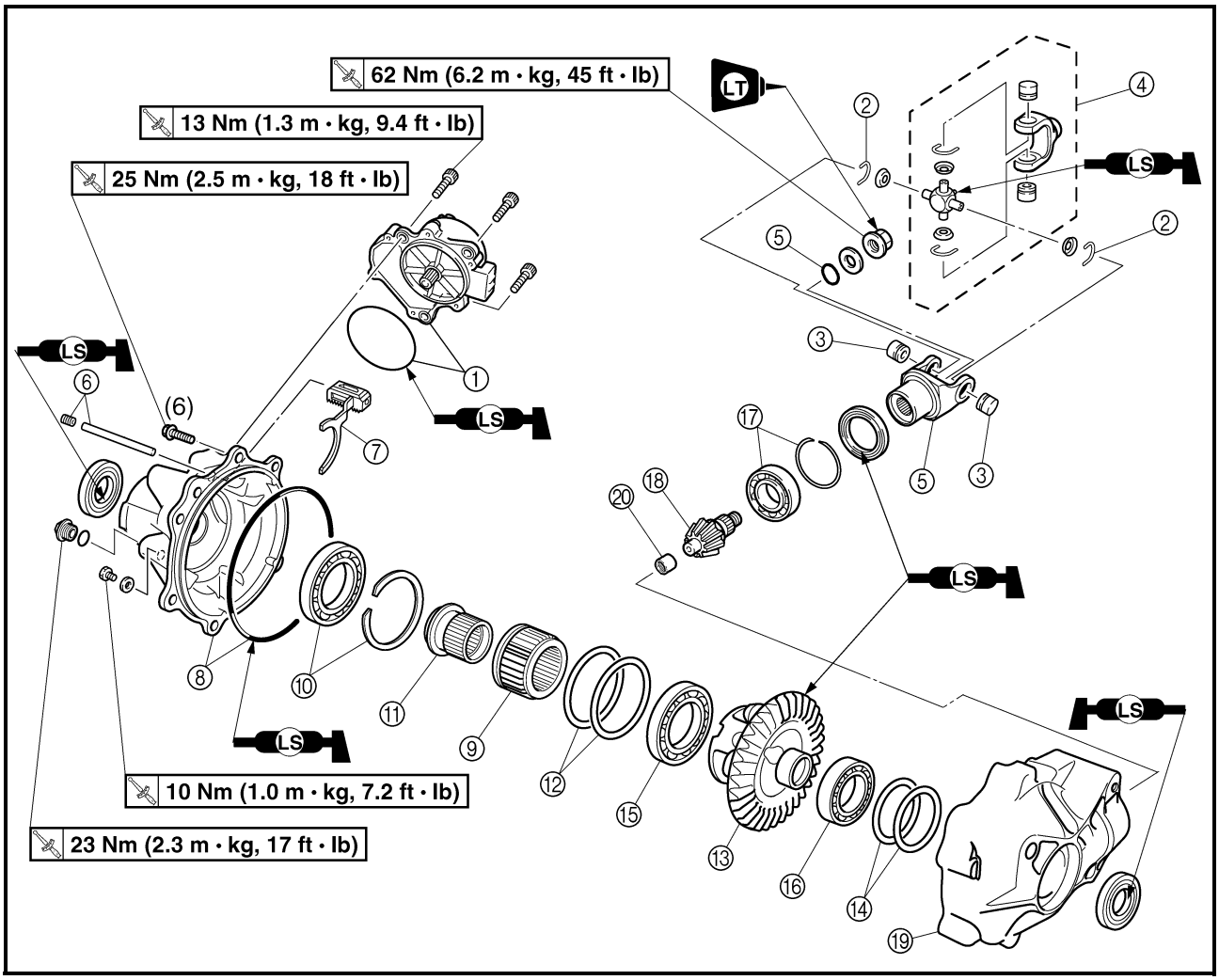
Order	Job/Part	Q'ty	Remarks
4	Differential gear assembly	1	
5	Drive shaft	1	
6	Compression spring	1	
			For installation, reverse the removal procedure.



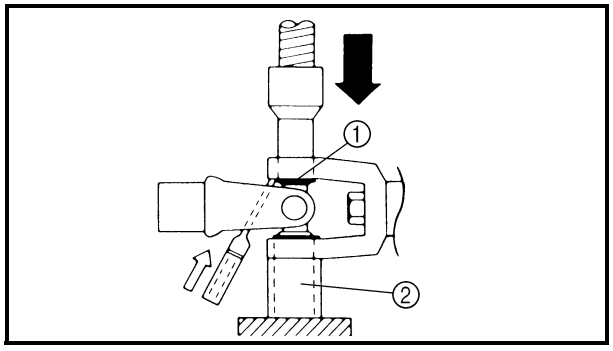
Order	Job/Part	Q'ty	Remarks
	Disassembling the constant velocity joint		Remove the parts in the order listed.
①	Circlip	1	
②	Boot band	2	
③	Boot band	2	
④	Dust boot	2	
⑤	Circlip	1	Refer to "ASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS".
⑥	Double off-set joint	1	
⑦	Circlip	1	
⑧	Ball bearing	1	
⑨	Joint shaft assembly	1	
			For assembly, reverse the disassembly procedure.

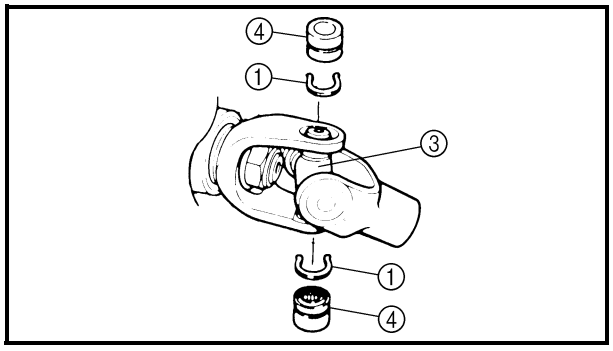


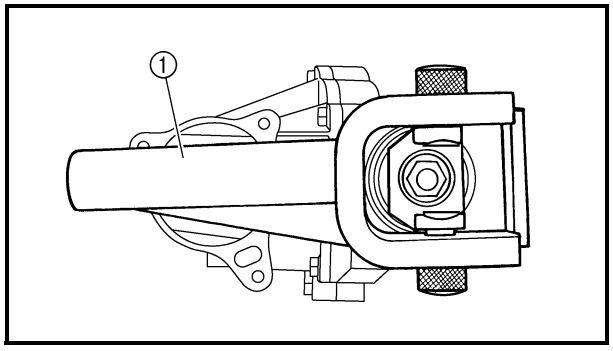
Order	Job/Part	Q'ty	Remarks
	Disassembling the differential gear		Remove the parts in the order listed.
①	Gear motor/O-ring	1/1	**NOTE:** Do not disassemble the gear motor or remove the pinion gear.
②	Circlip	2	Refer to "DISASSEMBLING THE UNIVERSAL JOINT" and "ASSEMBLING THE UNIVERSAL JOINT."
③	Bearing	2	
④	Universal joint	1	
⑤	Universal joint yoke/O-ring	1/1	
⑥	Stopper bolt/shaft	1/1	
⑦	Shift fork (with shift fork sliding gear)	1	
⑧	Differential gear case cover/O-ring	1/1	
⑨	Drive clutch	1	
⑩	Circlip/bearing	1/1	
⑪	Adapter	1	

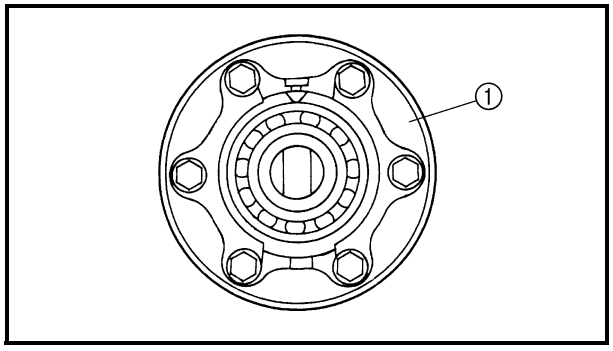


Order	Job/Part	Q'ty	Remarks
⑫	Shim (right)		
⑬	Differential gear assembly	1	
⑭	Shim (left)		
⑮	Bearing	1	
⑯	Bearing	1	
⑰	Circlip/bearing	1/1	
⑱	Drive pinion gear	1	
⑲	Differential gear case	1	
⑳	Bearing	1	
			For assembly, reverse the disassembly procedure.









DISASSEMBLING THE UNIVERSAL JOINT

1. Remove:
   - universal joint

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a. Remove the circlips ①.
b. Place the universal joint in a press.
c. With a suitable diameter pipe ② beneath the yoke ③, press the bearing ④ into the pipe as shown.

NOTE:

It may be necessary to lightly tap the yoke with a punch.

d. Repeat the steps for the opposite bearing.
e. Remove the yoke.

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2. Remove:
   - universal joint yoke

   Use a universal joint holder ①.

	Universal joint holder **P/N. YM-04062, 90890-04062**

REMOVING THE DIFFERENTIAL GEAR ASSEMBLY

1. Remove:
   - differential gear assembly ①

NOTE:

The ring gear and the differential gear should be fastened together. Do not disassemble the differential gear assembly.

CAUTION:

The differential gears are assembled into a proper unit at the factory by means of specialized equipment. Do not attempt to disassemble this unit. Disassembly will result in the malfunction of the unit.

CHECKING THE CONSTANT VELOCITY JOINTS

1. Check:
   - double off-set joint spline
   - ball joint spline
   - shaft spline

   Wear/damage → Replace.
2. Check:
   - dust boots

   Cracks/damage → Replace.

CAUTION:

Always use a new boot band.

3. Check:
   - balls and ball races
   - inner surface of double off-set joint

   Pitting/wear/damage → Replace.

CHECKING THE DIFFERENTIAL GEAR

1. Check:
   - gear teeth

     Pitting/galling/wear → Replace drive pinion gear and ring gear as a set.
   - bearings

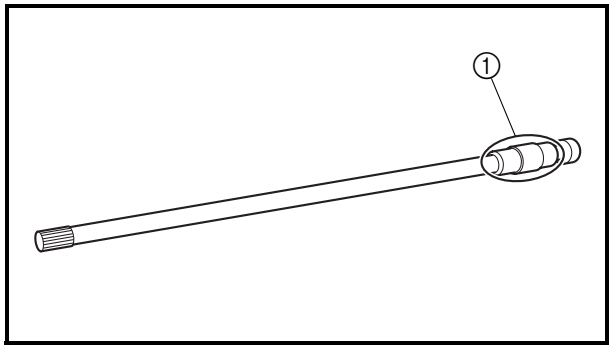
     Pitting/damage → Replace.
   - oil seals
   - O-rings

     Damage → Replace.
2. Check:
   - drive shaft splines
   - universal joints
   - drive pinion gear splines

     Wear/damage → Replace.
   - spring

     Fatigue → Replace.

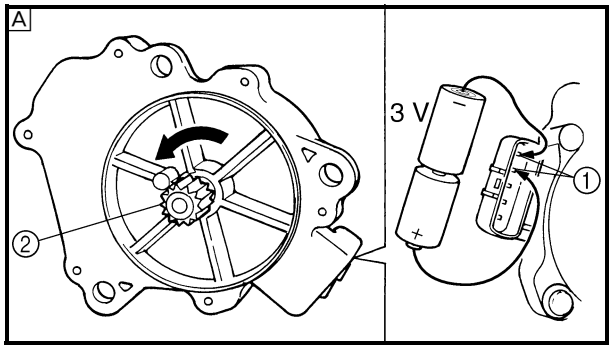
     Move the spring up and down.

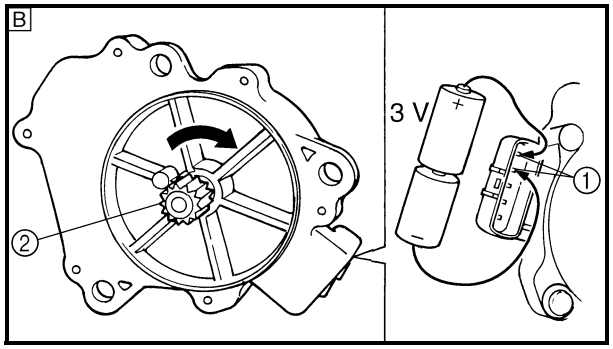


3. Check:
   - front drive shaft
     Bends → Replace.
   - torque limiter
     Loose → Replace the front drive shaft.

⚠ WARNING

Do not attempt to straighten a bent shaft; this may dangerously weaken the shaft.





CHECKING THE GEAR MOTOR

1. Check:
   - gear motor

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a. Connect two C size batteries to the gear motor terminals ① (as shown in the illustrations).

CAUTION:

- **Do not use a 12 V battery to operate the pinion gear.**
- **Do not connect the batteries to the gear motor when it is installed in the gear case. The gear motor should be checked when it is removed from the gear case.**

A Check that the pinion gear ② turns counterclockwise.
B Check that the pinion gear ② turns clockwise.

NOTE:

Do not disassemble the gear motor or remove the pinion gear.

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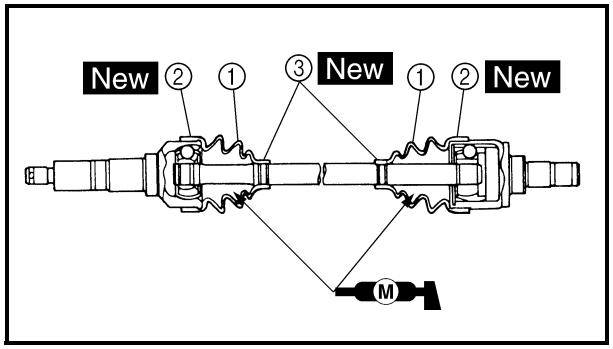
ASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS

1. Apply:
   - molybdenum disulfide grease
     (into the ball joint assembly)

NOTE:

Molybdenum disulfide grease is included in the repair kit.



2. Install:
   • dust boots ①
   • boot bands ②, ③ New

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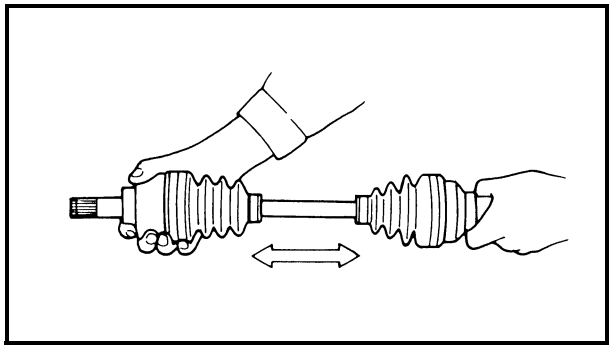
a. Apply molybdenum disulfide grease into the dust boots.

Molybdenum disulfide grease
40 g (1.4 oz) per dust boot (front wheel side)
45 g (1.6 oz) per dust boot (differential gear case side)

b. Install the dust boots.
c. Install the dust boot bands.

NOTE:
- The new boot bands may differ from the original ones.
- The dust boots should be fastened with the boot bands ③ at the grooves in the joint shaft.



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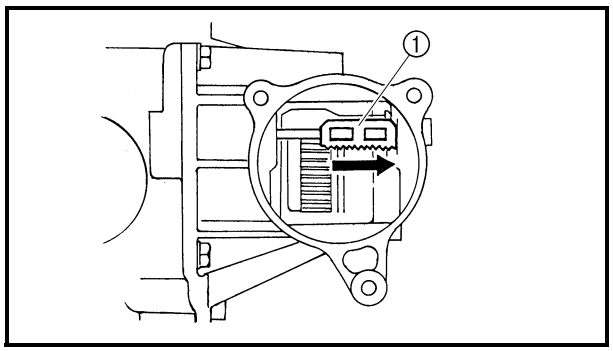
3. Check:
   • free play (thrust movement)
   Excessive play → Replace the joint assembly.

ASSEMBLING THE DIFFERENTIAL GEAR

1. Measure:
   • gear lash
   Refer to “MEASURING AND ADJUSTING THE DIFFERENTIAL GEAR LASH”.



2. Install:
   • gear motor

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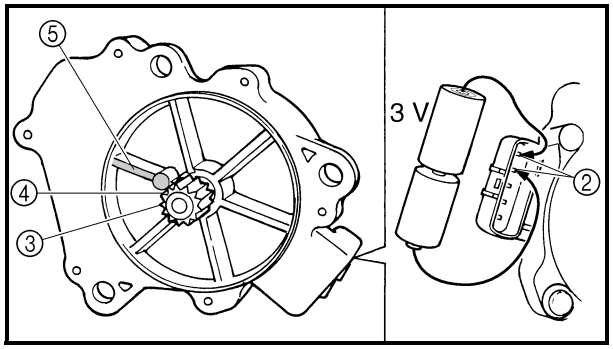
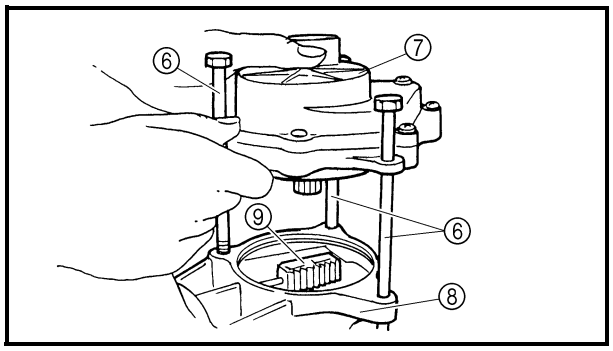
a. Slide the shift fork sliding gear ①, which is installed to the differential gear, to the right to put it into the 2WD mode.





b. Connect two C size batteries to the gear motor terminal ② to operate the pinion gear ③. Operate the pinion gear until the paint mark ④ on the gear is aligned with the paint mark ⑤ on the gear motor case.

CAUTION:

Do not use a 12 V battery to operate the pinion gear.

c. Insert 8 mm bolts ⑥ into the gear motor ⑦ and use them as a guide to set the motor on the differential gear assembly ⑧ so that the shift fork sliding gear ⑨ does not move.

CAUTION:

If the position of the shift fork sliding gear is moved, the position of the differential gear and the indicator light display may differ, and the 2WD or differential lock mode may not be activated.

d. Remove the 8 mm bolts, and then install the motor with the gear motor bolts.

	Gear motor bolts **13 Nm (1.3 m · kg, 9.4 ft · lb)**

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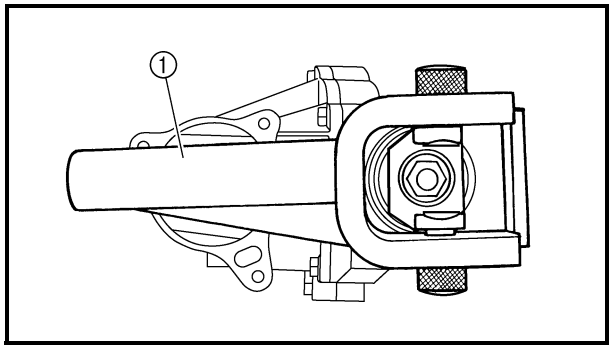


3. Install:
   - universal joint yoke
   - O-ring
   - washer
   - nut

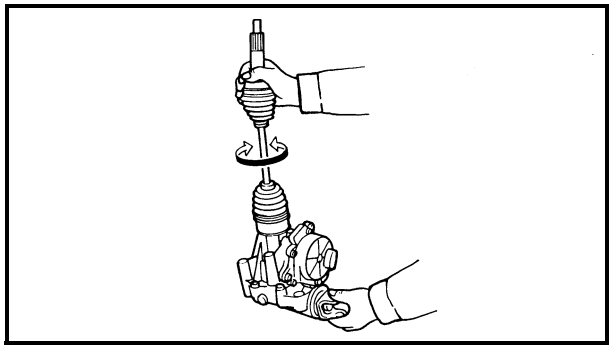
   62 Nm (6.2 m · kg, 45 ft · lb)

   Use a universal joint holder ①.

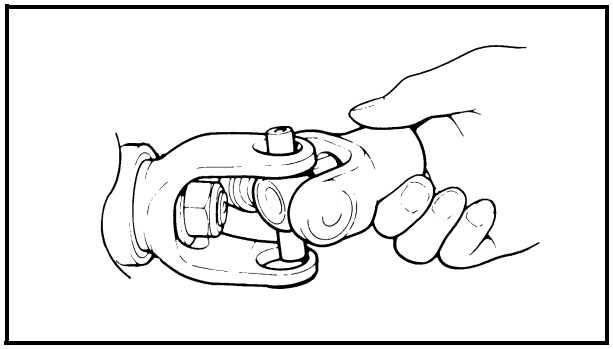
	Universal joint holder **P/N. YM-04062, 90890-04062**

NOTE:

Apply locking agent (LOCTITE®) to the nut threads.



4. Check:
   • differential gear operation
   Unsmooth operation → Replace the differential gear assembly.
   Insert the double off-set joint into the differential gear, and turn the gear back and forth.



ASSEMBLING THE UNIVERSAL JOINT

1. Install:
   • universal joint

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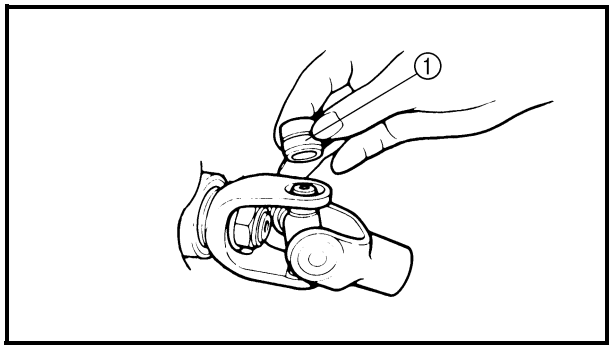
a. Install the opposite yoke into the universal joint.
b. Apply wheel bearing grease to the bearings.
c. Install the bearing ① onto the yoke.



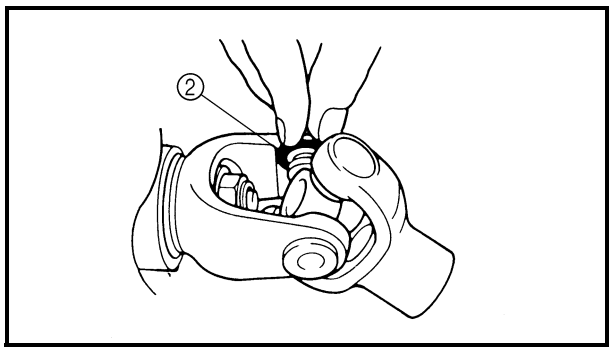
CAUTION:

Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of plate.

d. Press each bearing into the universal joint using a suitable socket.

NOTE:

The bearing must be inserted far enough into the universal joint so that the circlip can be installed.



e. Install the circlips ② into the groove of each bearing.

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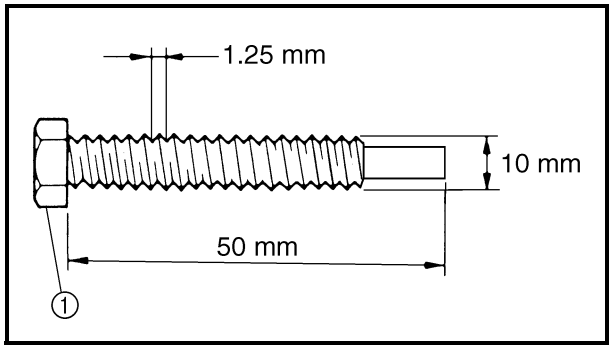
MEASURING AND ADJUSTING THE DIFFERENTIAL GEAR LASH

Measuring the differential gear lash

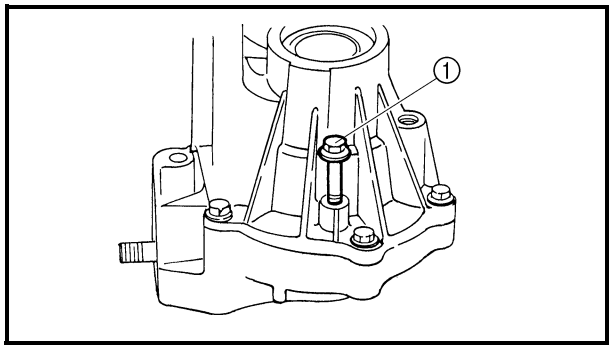
1. Secure the gear case in a vise or another supporting device.
2. Remove:
   • drain plug
   • gasket

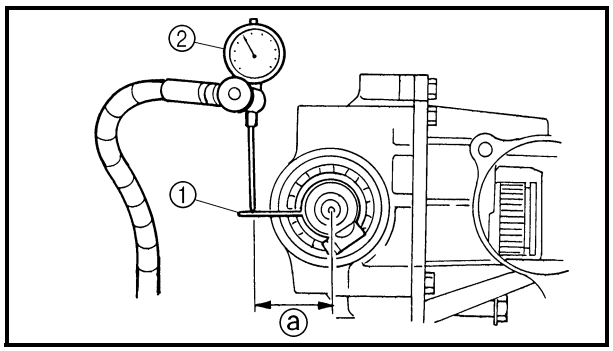


3. Install:
   • a bolt of the specified size ①
   (into the drain plug hole)

CAUTION:

Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.





4. Attach:
   • gear lash measurement tool ①
   • dial gauge ②

	Gear lash measurement tool **P/N. YM-01467, 90890-01467**

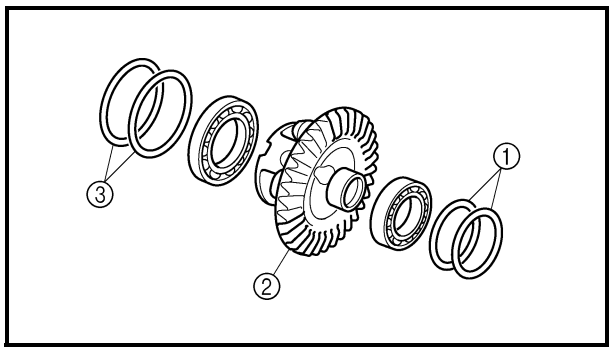
ⓐ Measuring point is 21 mm (0.83 in)

5. Measure:
   • gear lash
   Gently rotate the gear coupling from engagement to engagement.

	Differential gear lash **0.05 ~ 0.25 mm** **(0.002 ~ 0.010 in)**

NOTE:

Measure the gear lash at four positions. Rotate the shaft 90° each time.



Adjusting the differential gear lash

1. Remove:
   • shim(s) (left) ①
   • differential gear assembly ②
   • shim(s) (right) ③

2. Adjust:
   • gear lash

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a. Select the suitable shims using the following chart.

Too little gear lash	**Reduce right shim thickness.**
Too large gear lash	**Increase right shim thickness.**

	Ring gear shim (left and right)
Thickness (mm)	**0.1 0.5** **0.2 1.0** **0.3 1.5*** **0.4**

* right shim only

NOTE:

- Use a combination of shims (left and right) so that the differential gear lash is within specification.
- Always keep the total combined thickness of the shims (left and right) the same.

Example:
If the differential gear lash exceeds the specification, increase the thickness of the right shim(s) by 0.1 mm (0.004 in) and decrease the thickness of the left shim(s) by 0.1 mm (0.004 in).

b. Measure the differential gear lash again.

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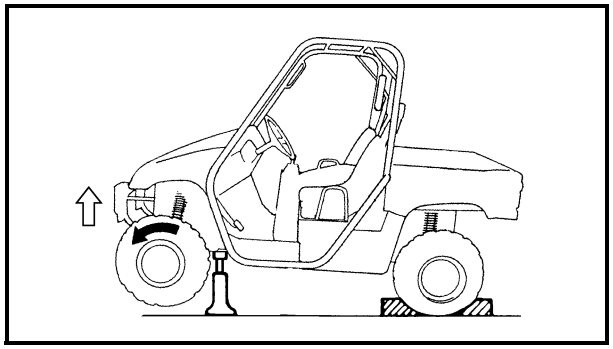
CHECKING THE DIFFERENTIAL GEAR OPERATION

1. Block the rear wheels, and elevate the front wheels by placing a suitable stand under the frame.
2. Remove the center cap from the axle nut (right or left).



3. Measure the starting torque of the front wheel (i.e., differential gear preload) with a torque wrench.

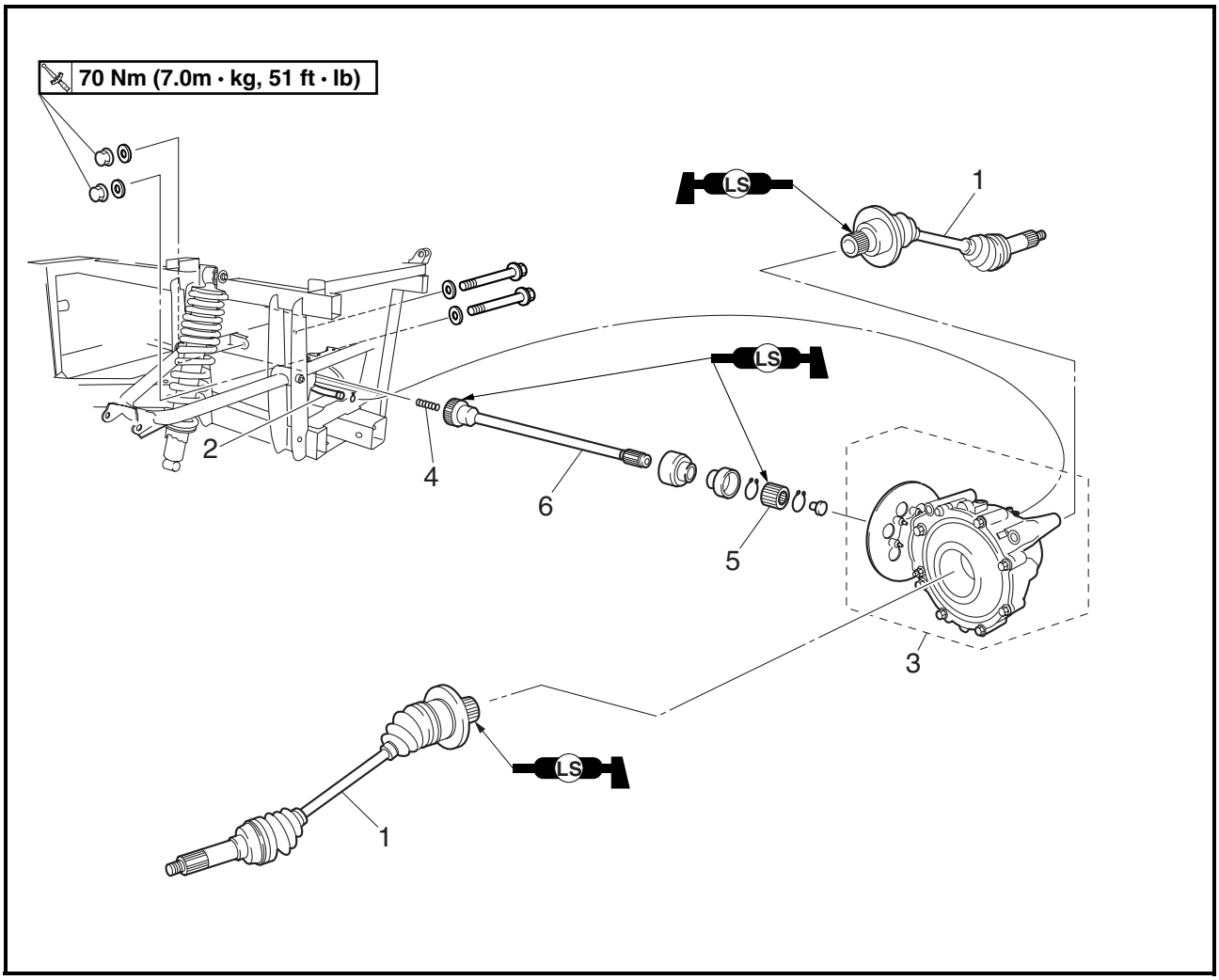
NOTE:

- Repeat this step several times to obtain an average figure.
- During this test, the other front wheel will turn in the opposite direction.

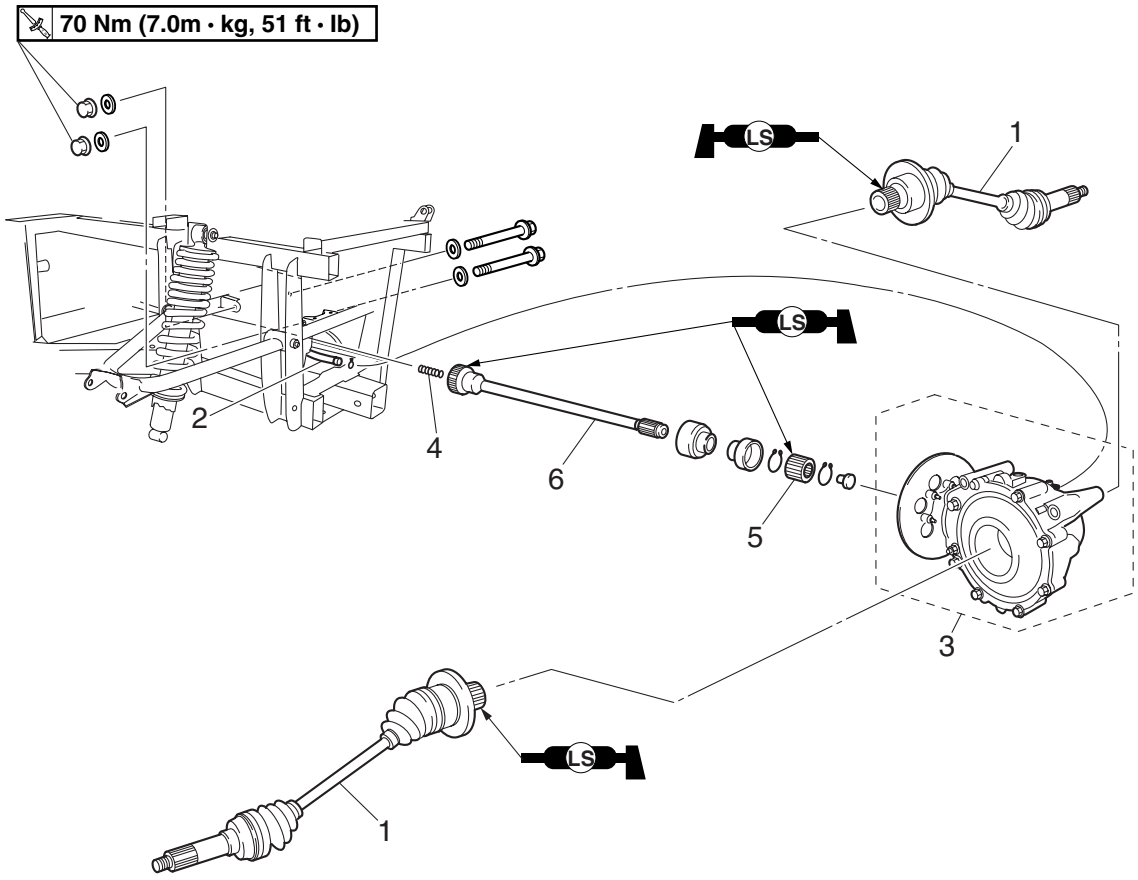
Front wheel starting torque (differential gear preload)
New unit
17 ~ 25 Nm
(1.7 ~ 2.5 m · kg, 12 ~ 18 ft · lb)
Minimum
10 Nm (1.0 m · kg, 7.2 ft · lb)

4. Out of specification → Replace the differential gear assembly.
5. Within specification → Install the new cotter pin and wheel cap.

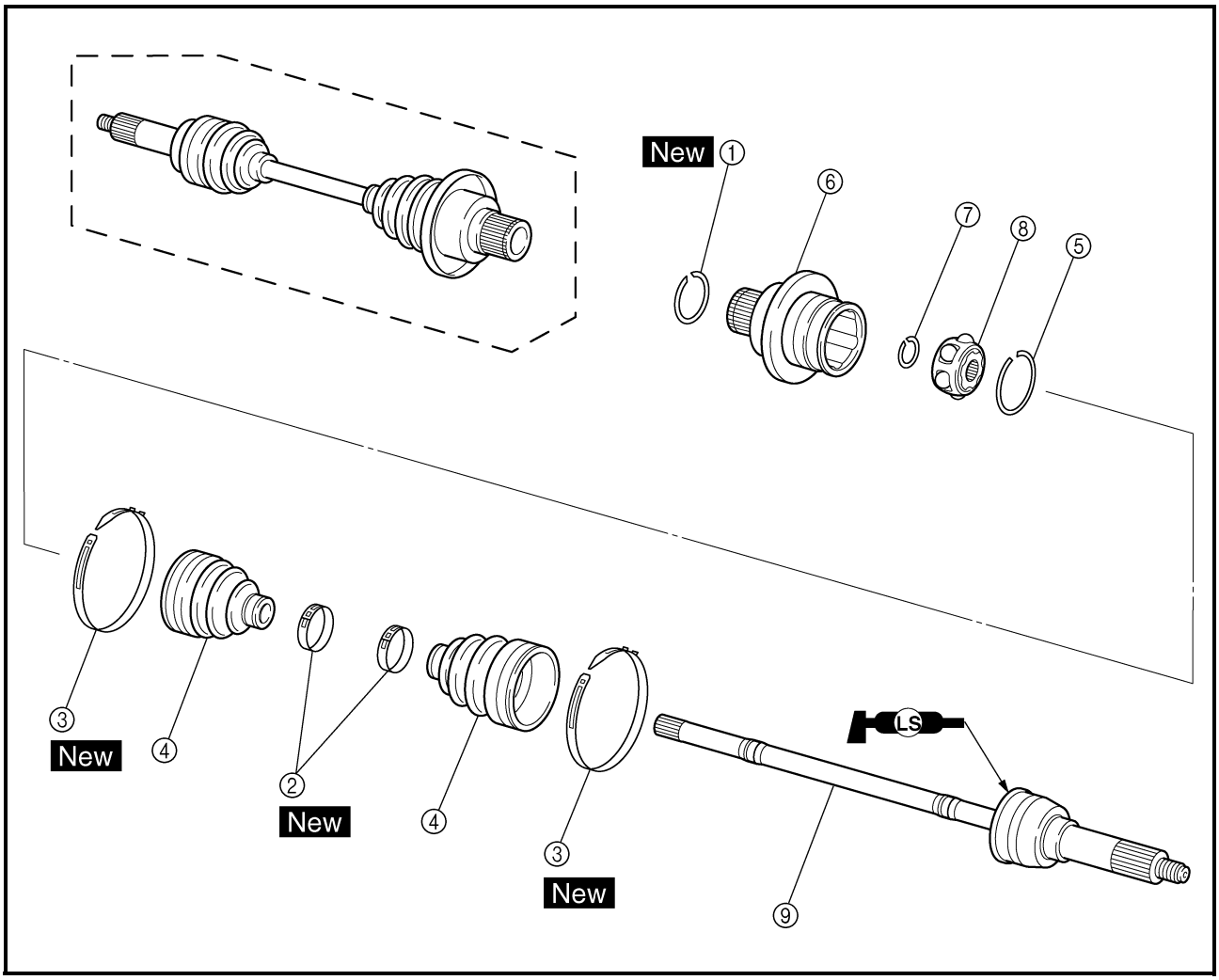
REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE SHAFT



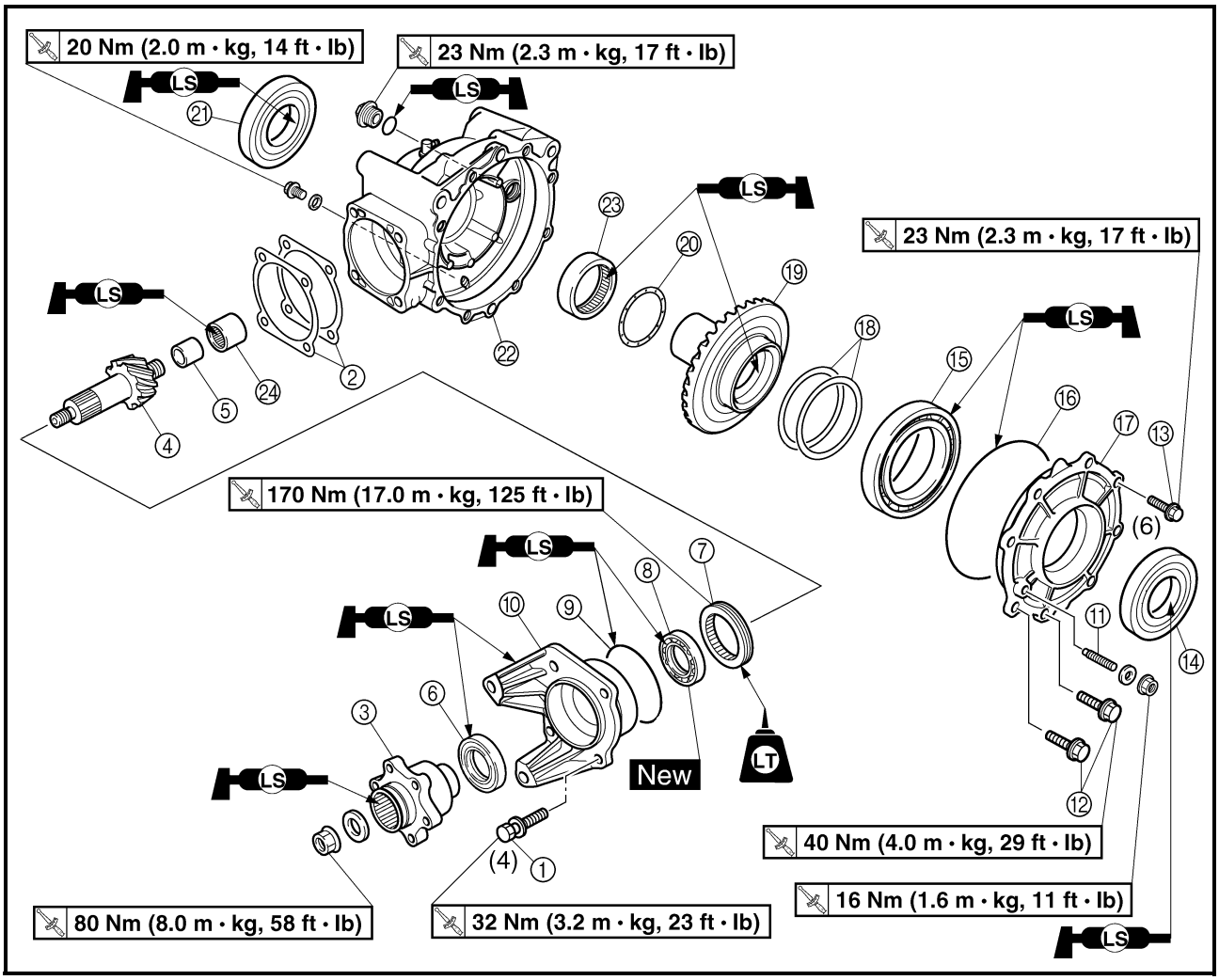
Order	Job/Part	Q'ty	Remarks
	Removing the rear constant velocity joints, final drive gear and drive shaft		Remove the parts in the order listed.
	Rear skid plate		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED" in chapter 8.
	Muffler/exhaust pipe		Refer to "ENGINE REMOVAL" in chapter 4.
	Final gear oil		Drain.
	Rear knuckle		Refer to "REAR KNUCKLE AND STABILIZER" in chapter 8.
	Rear lower arm		Refer to "REAR ARMS AND REAR SHOCK ABSORBER" in chapter 8.
	Brake caliper assembly		Refer to "FRONT AND REAR BRAKES" in chapter 8.



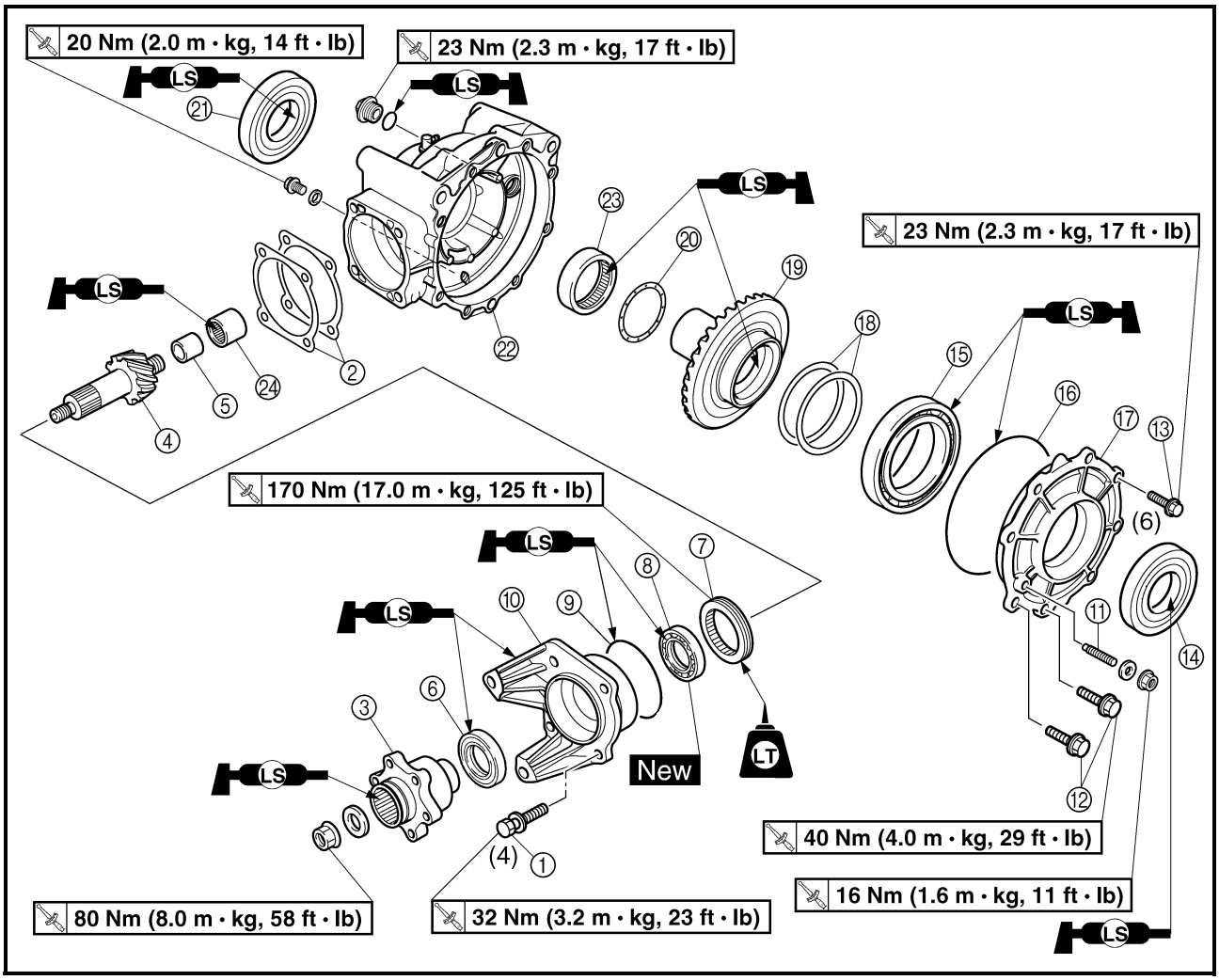
Order	Job/Part	Q'ty	Remarks
1	Rear constant velocity joint	2	**NOTE:** Remove the constant velocity joint on the right side of the vehicle, rotate the final gear assembly slightly so that the constant velocity joint on the left side clears the frame, and then remove it.
2	Final drive gear case breather hose	1	Disconnect.
3	Final drive gear assembly	1	
4	Compression spring	1	
5	Coupling gear	1	
6	Drive shaft	1	For installation, reverse the removal procedure.



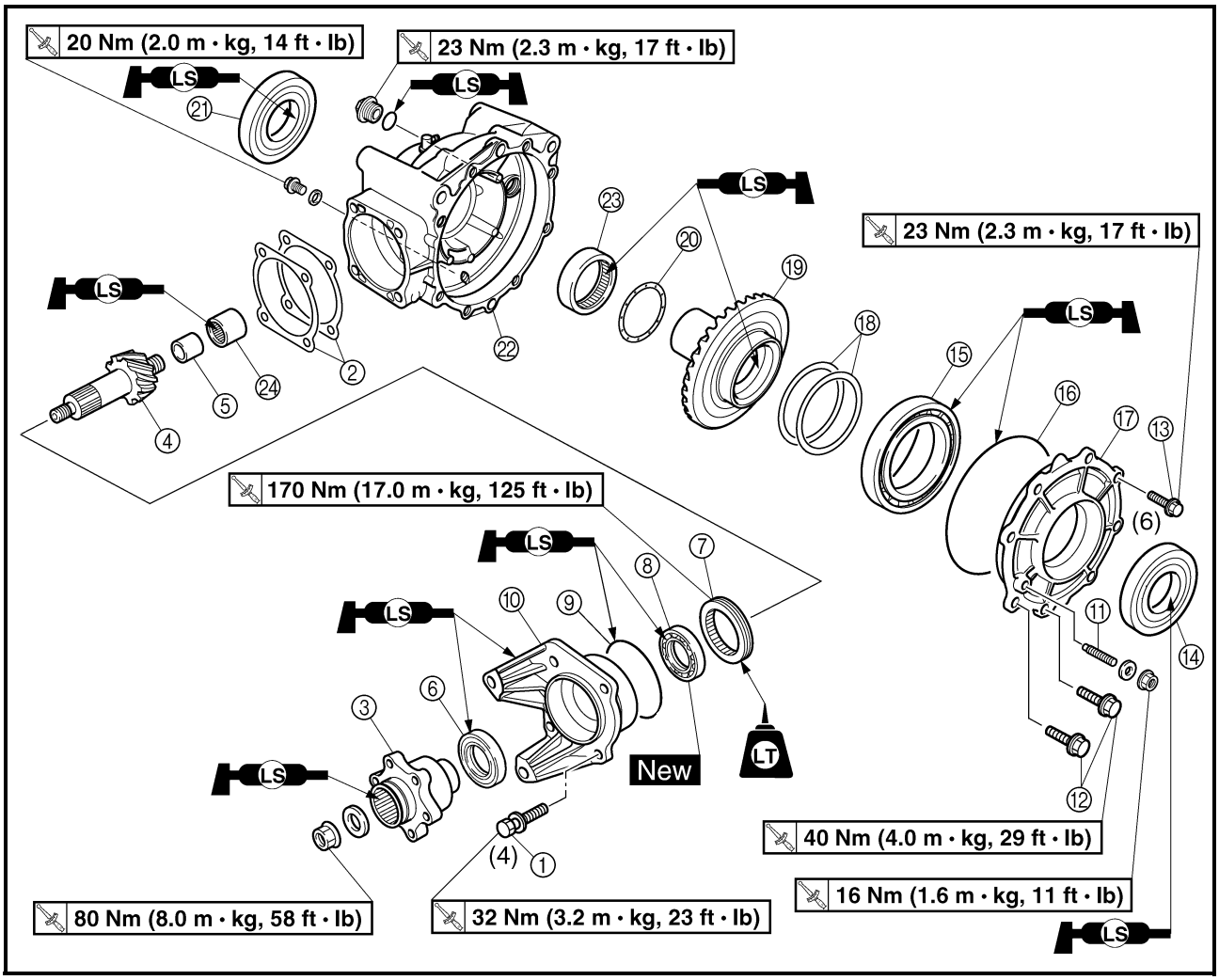
Order	Job/Part	Q'ty	Remarks
	Disassembling the rear constant velocity joint		Remove the parts in the order listed.
①	Circlip	1	
②	Boot band	2	
③	Boot band	2	
④	Dust boot	2	
⑤	Circlip	1	Refer to "ASSEMBLING THE REAR CONSTANT VELOCITY JOINTS".
⑥	Double off-set joint	1	
⑦	Circlip	1	
⑧	Ball bearing	1	
⑨	Joint shaft assembly	1	
			For assembly, reverse the disassembly procedure.


20 Nm (2.0 m · kg, 14 ft · lb)
23 Nm (2.3 m · kg, 17 ft · lb)
23 Nm (2.3 m · kg, 17 ft · lb)
170 Nm (17.0 m · kg, 125 ft · lb)
40 Nm (4.0 m · kg, 29 ft · lb)
16 Nm (1.6 m · kg, 11 ft · lb)
80 Nm (8.0 m · kg, 58 ft · lb)
32 Nm (3.2 m · kg, 23 ft · lb)
LS
LT
New

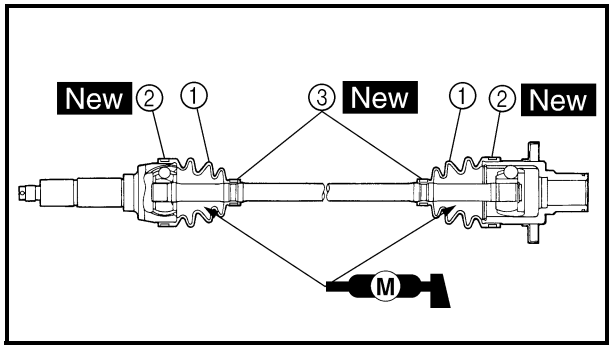
Order	Job/Part	Q'ty	Remarks
	Disassembling the final gear case		Remove the parts in the order listed.
	Rear brake disc		Refer to "REAR WHEELS AND BRAKE DISC" in chapter 8.
①	Bolt	4	
②	Final drive pinion gear shim	*	
③	Drive shaft coupling	1	Refer to "DISASSEMBLING THE FINAL GEAR CASE" and "ASSEMBLING THE FINAL GEAR CASE".
④	Final drive pinion gear	1	
⑤	Inner race	1	
⑥	Oil seal	1	
⑦	Bearing retainer	1	
⑧	Bearing	1	
⑨	O-ring	1	
⑩	Final drive pinion gear bearing housing	1	
⑪	Ring gear stopper	1	


20 Nm (2.0 m · kg, 14 ft · lb)
23 Nm (2.3 m · kg, 17 ft · lb)
23 Nm (2.3 m · kg, 17 ft · lb)
170 Nm (17.0 m · kg, 125 ft · lb)
40 Nm (4.0 m · kg, 29 ft · lb)
16 Nm (1.6 m · kg, 11 ft · lb)
80 Nm (8.0 m · kg, 58 ft · lb)
32 Nm (3.2 m · kg, 23 ft · lb)
LS
LT
New

Order	Job/Part	Q'ty	Remarks
⑫	Bolt	2	**NOTE:** Working in a crisscross pattern, loosen each bolt 1/4 of a turn. After all the bolts are loosened, remove them.
⑬	Bolt	6	
⑭	Oil seal	1	
⑮	Bearing	1	
⑯	O-ring	1	
⑰	Ring gear bearing housing	1	
⑱	Ring gear shim	*	
⑲	Ring gear	1	
⑳	Thrust washer	1	
㉑	Oil seal	1	
㉒	Final gear case	1	


20 Nm (2.0 m · kg, 14 ft · lb)
23 Nm (2.3 m · kg, 17 ft · lb)
23 Nm (2.3 m · kg, 17 ft · lb)
170 Nm (17.0 m · kg, 125 ft · lb)
40 Nm (4.0 m · kg, 29 ft · lb)
16 Nm (1.6 m · kg, 11 ft · lb)
80 Nm (8.0 m · kg, 58 ft · lb)
32 Nm (3.2 m · kg, 23 ft · lb)
LS
LT
New

Order	Job/Part	Q'ty	Remarks
㉓	Bearing	1	Refer to "REMOVING THE FINAL DRIVE ROLLER BEARINGS" and "INSTALLING THE FINAL DRIVE ROLLER BEARINGS".
㉔	Bearing	1	
			For assembly, reverse the disassembly procedure.



ASSEMBLING THE REAR CONSTANT VELOCITY JOINTS

1. Apply:
   - molybdenum disulfide grease (into the ball joint assembly)
2. Install:
   - dust boots ①
   - boot bands ②, ③ New

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a. Apply molybdenum disulfide grease into the dust boots.

Molybdenum disulfide grease
40 g (1.8 oz) per dust boot (rear wheel side)
60 g (2.3 oz) per dust boot (final gear case side)

b. Install the dust boots.
c. Install the dust boot bands.

NOTE:

- The new boot bands may differ from the original ones.
- The dust boots should be fastened with the boot bands ③ at the grooves in the joint shaft.

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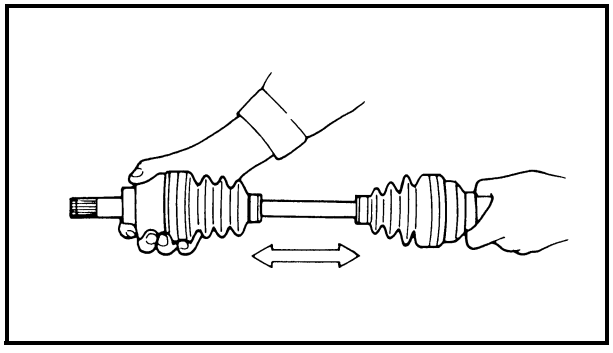
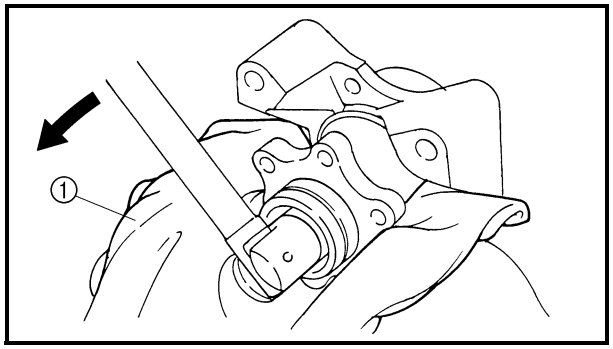


3. Check:
   - free play (thrust movement)
     Excessive play → Replace the joint assembly.



DISASSEMBLING THE FINAL GEAR CASE

1. Remove:
   - drive shaft coupling nut

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a. Place a folded rag ①.
b. Secure the drive shaft coupling edge in the vise.
c. Remove the drive shaft coupling nut.

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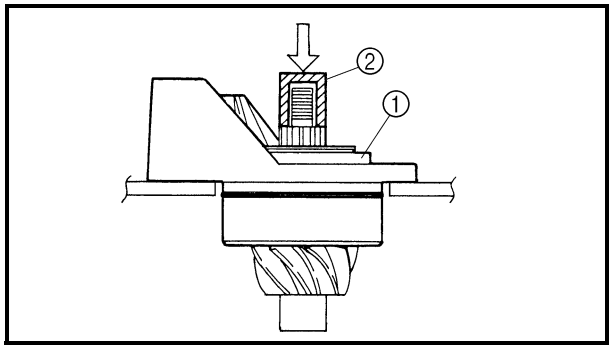

2. Remove:
   • final drive pinion gear bearing housing assembly ①

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a. Clean the outside surface of the final drive pinion gear.
b. Place the final drive pinion gear in a hydraulic press.

CAUTION:

- **Never directly press the gear end with a hydraulic press, this will result in damage to the gear thread.**
- **Install the suitable socket ② on the gear end to protect the thread from damage.**

c. Press the gear end and remove the bearing housing assembly.

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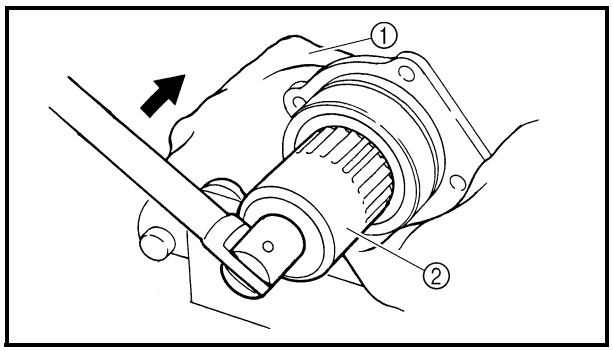

3. Remove:
   • bearing retainer

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a. Place a folded rag ①.
b. Secure the final drive pinion gear bearing housing edge in the vise.
c. Attach the bearing retainer wrench ②.

	Bearing retainer wrench **P/N. YM-04128, 90890-04128**

d. Remove the bearing retainer.

CAUTION:

The bearing retainer has left-handed threads. To loosen the retainer, turn it clockwise.

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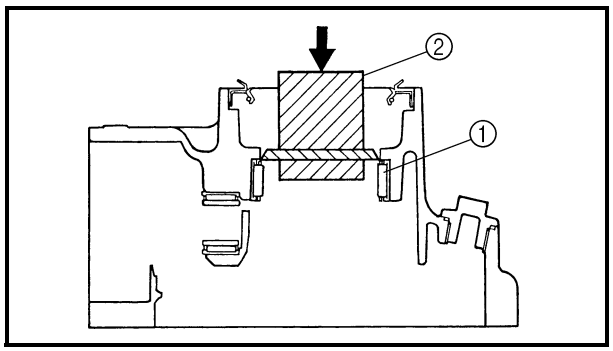
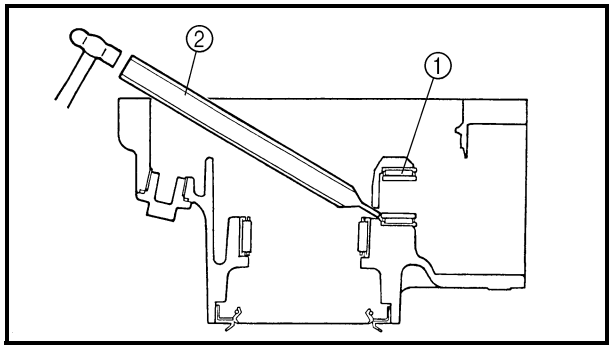


REMOVING THE FINAL DRIVE ROLLER BEARINGS

1. Remove:
   • roller bearing (ring gear) ①
   Use a suitable press tool ② and an appropriate support for the main housing.



2. Remove:
   • roller bearing (final drive pinion gear) ①

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a. Heat the main housing only to 150 °C (302 °F).
b. Remove the roller bearing outer race with an appropriately shaped punch ②.
c. Remove the inner race from the final drive pinion gear.

NOTE:

The removal of the final drive pinion gear roller bearing is difficult and seldom necessary.

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INSTALLING THE FINAL DRIVE ROLLER BEARINGS

1. Install:
   • roller bearing (final drive pinion gear) New

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a. Heat the main housing only to 150 °C (302 °F).
b. Install the roller bearing outer race using the proper adapter.
c. Install the inner race onto the drive pinion gear.

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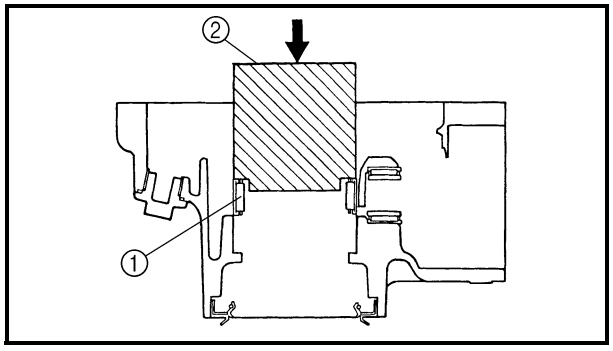
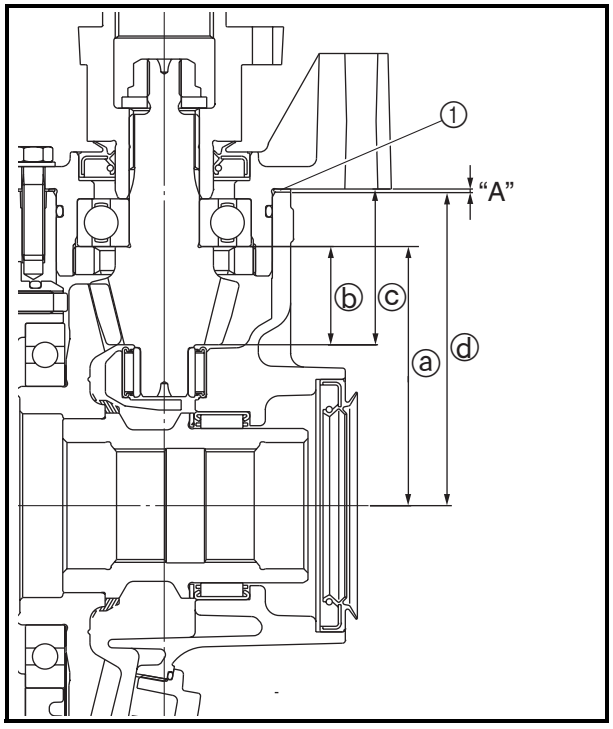
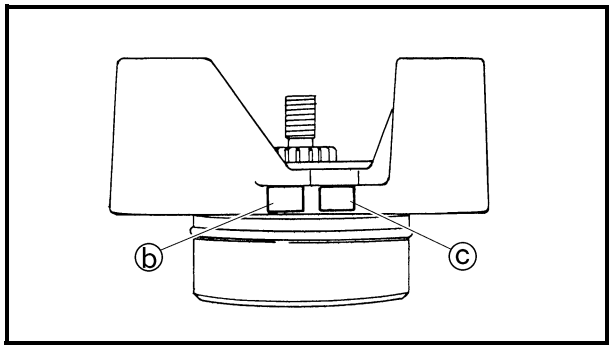


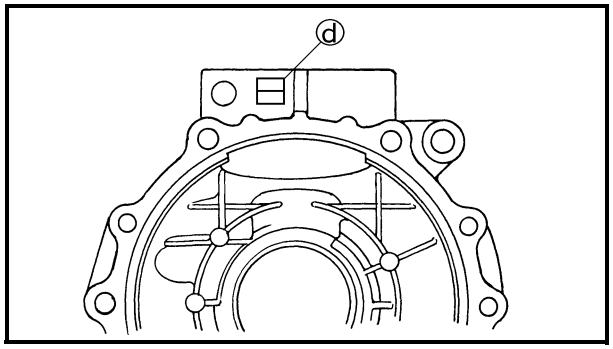
2. Install:
   • roller bearing (ring gear) ①
     Use a suitable press tool ② and a press to install the above components into the main housing.

POSITIONING THE FINAL DRIVE PINION GEAR AND RING GEAR

When the final drive pinion gear, ring gear, final gear case and/or ring gear bearing housing are replaced, be sure to adjust the positions of the final drive pinion gear and ring gear using the shim(s).







Selecting the final drive pinion gear shim

1. Select:
   - final drive pinion gear shim(s) ①

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a. To find the final drive pinion gear shim thickness "A", use the following formula.

Final drive pinion gear shim thickness:
"A" = ⓐ + (ⓒ – ⓑ) – ⓓ

ⓐ = 92.5 mm

ⓑ = a numeral (usually a decimal number) on the final drive pinion gear bearing housing either added to "34"

ⓒ = a numeral (usually a decimal number) on the final drive pinion gear bearing housing either added to "55"

ⓓ = a numeral (usually a decimal number) on the final gear case either added to "112"

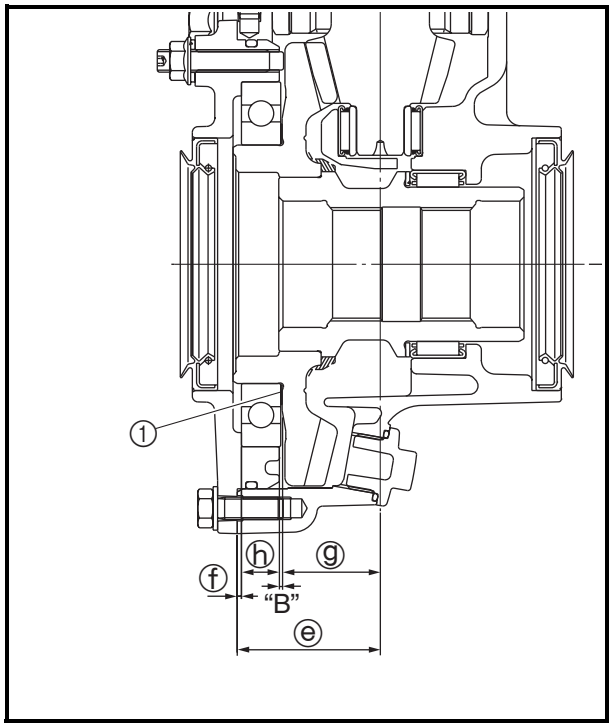
Example:

1) ⓐ = 92.5
2) If "98" is stamped on the final drive pinion gear bearing housing,
   ⓑ = 34 + 0.98
   = 34.98
3) If "48" is stamped on the final drive pinion gear bearing housing,
   ⓒ = 55 + 0.48
   = 55.48
4) If "03" is stamped on the final gear case,
   ⓓ = 112 + 0.03
   = 112.03
5) Therefore, "A" is 0.97.
   "A" = 92.5 + (55.48 – 34.98) – 112.03
   = 0.97
6) Round off the hundredth digit and select the appropriate shim(s).
   In the example above, the calculated number is 0.97. The chart instructs you to round off 7 to 5 at the hundredth place. Thus, the shim thickness is 0.95 mm.

Hundredths	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thicknesses.

Final drive pinion gear shim	
Thickness (mm)	0.25 0.30 0.35 0.40 0.45 0.50



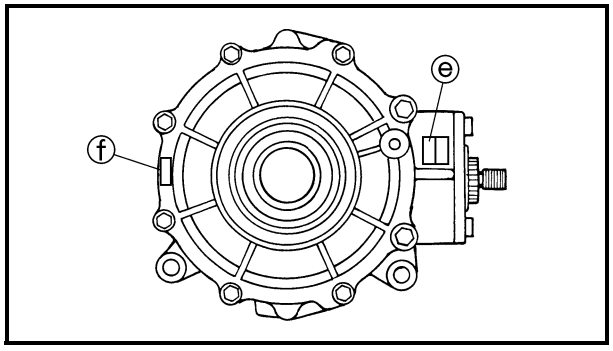
Selecting the ring gear shim

1. Select:
   • ring gear shim(s) ①

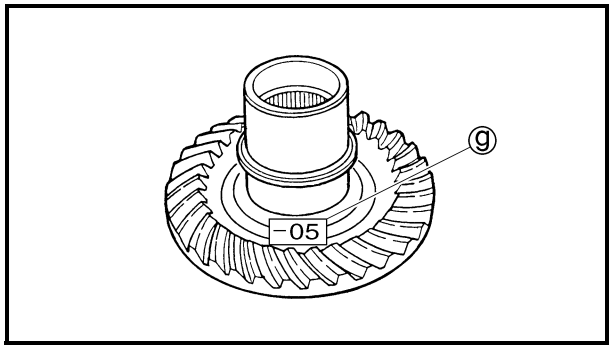
a. To find the ring gear shim thickness "B", use the following formula.

Ring gear shim thickness "B" = ⓔ – ⓕ – (ⓖ + ⓗ)

ⓔ = a numeral (usually a decimal number) on the final gear case either added to "50"
ⓕ = a numeral (usually a decimal number) on the outside of the ring gear bearing housing and added to 1
ⓖ = a numeral (usually a decimal number) on the inside of the ring gear either added to or subtracted from 35.00
ⓗ = bearing thickness (considered constant)



Bearing thickness ⓗ
14.00 mm



Example:

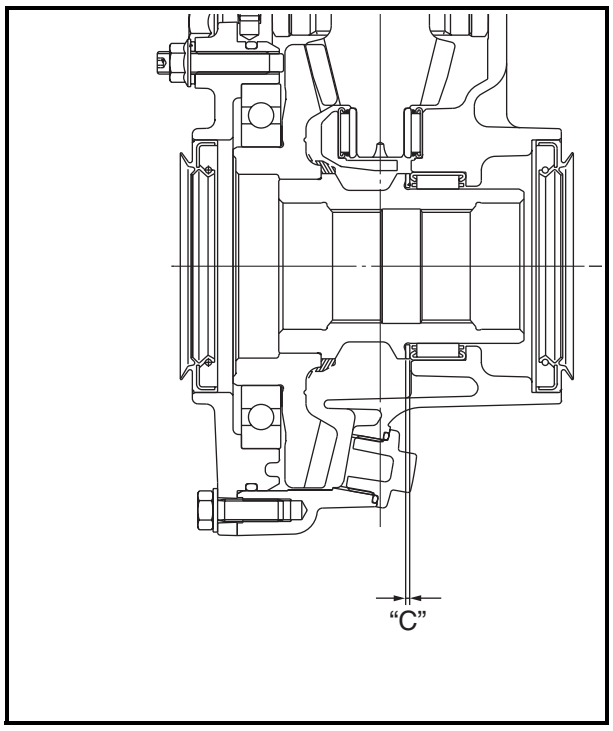
1) If "98" is stamped on the final gear case,
   ⓔ = 50 + 0.98
   = 50.98
2) If "55" is stamped on the ring gear bearing housing,
   ⓕ = 1 + 0.55
   = 1.55
3) If "–05" is stamped on the ring gear,
   ⓖ = 35 – 0.05
   = 34.95
4) ⓗ = 14.00
5) Therefore, shim thickness "B" is 0.48.
   "B" = 50.98 – 1.55 – (34.95 + 14.00)
   = 49.43 – 48.95
   = 0.48

6) Round off the hundredth digit and select the appropriate shim(s).
In the example above, the calculated number is 0.48. The chart instructs you to round off 8 to 10 at the hundredth place.
Thus, the shim thickness is 0.50 mm.

Hundredths	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thicknesses.

Ring gear shim			
Thickness (mm)	0.25	0.30	0.35
	0.40	0.45	0.50



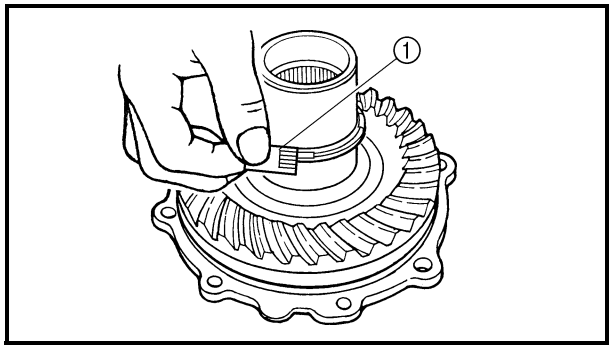
Selecting the thrust washer

1. Measure:
   • ring gear thrust clearance "C"

a. Place four pieces of Plastigauge® between the originally fitted thrust washer and the ring gear.
b. Install the final gear case assembly and tighten the bolts to specification.

M8 bolts (ring gear bearing housing)
23 Nm (2.3 m · kg, 17 ft · lb)
M10 bolts (ring gear bearing housing)
40 Nm (4.0 m · kg, 29 ft · lb)

NOTE:
Do not turn the drive pinion gear and ring gear when measuring the clearance with Plastigauge®.



c. Remove the final gear case assembly.
d. Measure the thrust clearance. Calculate the width of the flattened Plastigauge® ①.

Ring gear thrust clearance
0.1 ~ 0.2 mm (0.004 ~ 0.008 in)

e. If out of specification, select the correct washer.

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2. Select:
• ring gear thrust clearance "C"

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a. Select a suitable thrust washer using the following chart.

Thrust washer			
Thickness (mm)	1.0	1.1	1.2
	1.3	1.4	1.5
	1.6	1.7	1.8
	1.9	2.0	2.1

b. Repeat the measurement steps until the ring gear thrust clearance is within the specified limits.

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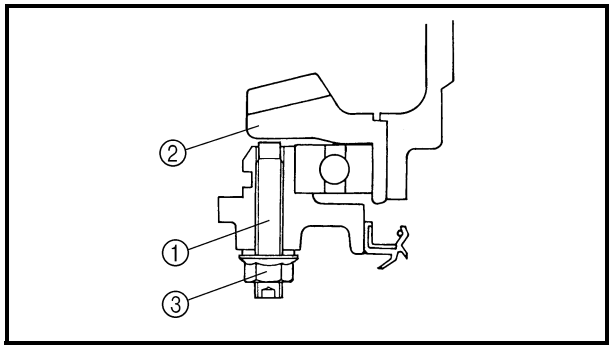

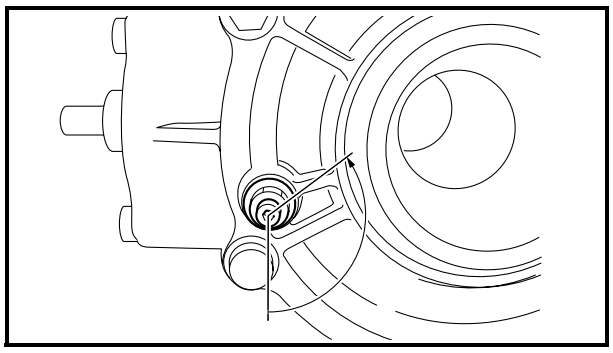

Adjusting the ring gear stopper
1. Install:
• ring gear stopper
• nut
2. Adjust:
• ring gear stopper clearance

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a. Finger tighten the ring gear stopper ① until it contacts the ring gear ②.
b. Turn the ring gear stopper 120° counter-clockwise.
c. Tighten the ring gear stopper nut ③.

Ring gear stopper nut
16 Nm (1.6 m · kg, 11 ft · lb)

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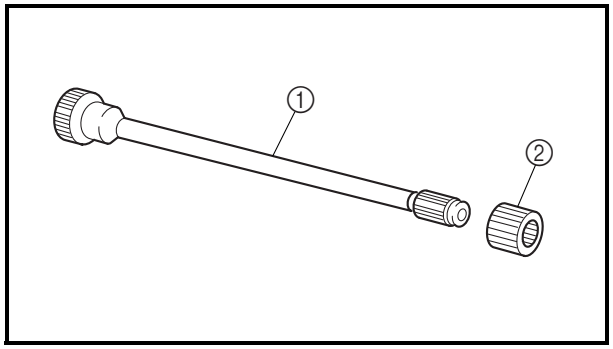
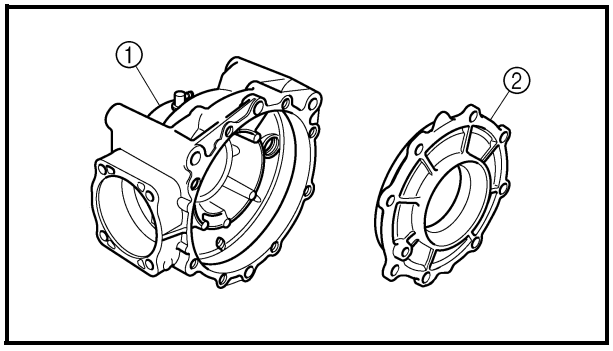


CHECKING THE DRIVE SHAFT

1. Check:
   - drive shaft (splines) ①
   - coupling gear (splines) ②
     Wear/damage → Replace.



CHECKING THE FINAL GEAR CASE

1. Check:
   - final gear case ①
   - ring gear bearing housing ②
     Cracks/damage → Replace.

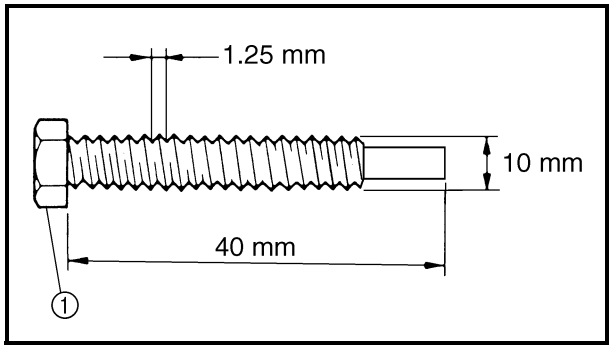
NOTE:

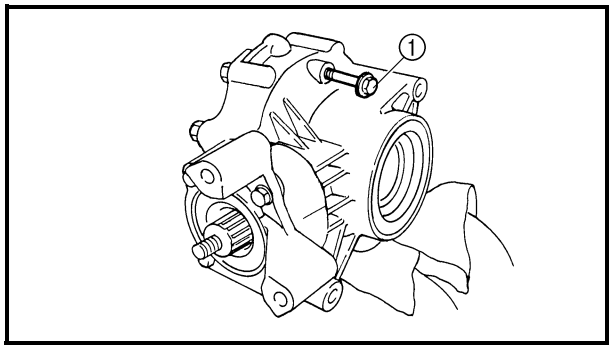
When the final gear case and/or the ring gear bearing housing are replaced, be sure to adjust the shim of the final drive pinion gear and/or ring gear.

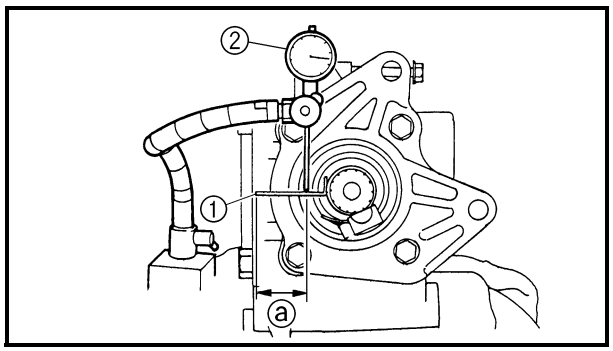
2. Check:
   - gear teeth
     Pitting/galling/wear → Replace the drive pinion gear and ring gear as a set.
   - oil seals
   - O-rings
     Damage → Replace.
3. Check:
   - bearings
     Damage → Replace.

NOTE:

- Reusing roller bearings is acceptable, but Yamaha recommends installing new ones. Do not reuse the oil seal.
- When the final drive pinion gear and/or ring gear are replaced, be sure to adjust the shim of the final drive pinion gear and/or ring gear.







MEASURING AND ADJUSTING THE FINAL GEAR LASH

Measuring the final gear lash

1. Secure the gear case in a vise or another supporting device.
2. Remove:
   - drain plug
   - gasket
3. Install:
   - a bolt of the specified size ①
     (into the drain plug hole)

CAUTION:

Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

4. Attach:
   - gear lash measurement tool ①
   - dial gauge ②

	Gear lash measurement tool **P/N. YM-01467, 90890-01467**

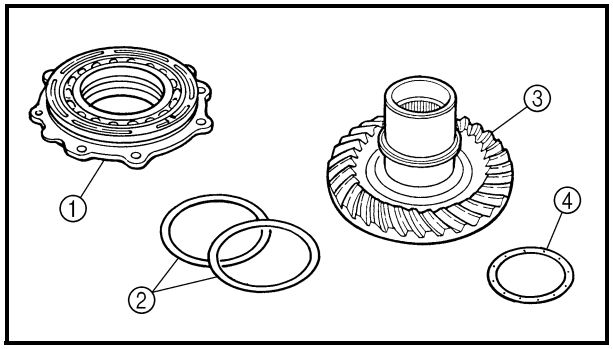
ⓐ Measuring point is 31.1 mm (1.22 in)

5. Measure:
   - gear lash
     Gently rotate the gear coupling from engagement to engagement.

	Final gear lash **0.1 ~ 0.3 mm (0.004 ~ 0.012 in)**

NOTE:

Measure the gear lash at four positions. Rotate the shaft 90° each time.



Adjusting the final gear lash

1. Remove:
   - ring gear bearing housing ①
   - ring gear shim(s) ②
   - ring gear ③
   - thrust washer ④
2. Adjust:
   - gear lash

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a. Select a suitable shim(s) and thrust washer(s) using the following chart.

Too little gear lash	**Reduce shim thickness.**
Too large gear lash	**Increase shim thickness.**

b. If increased by more than 0.2 mm (0.008 in):
   Reduce the thrust washer thickness by 0.2 mm (0.008 in) for every 0.2 mm of ring gear shim increase.
c. If reduced by more than 0.2 mm (0.008 in):
   Increase the thrust washer thickness by 0.2 mm (0.008 in) for every 0.2 mm that the ring gear shim is decreased.

Ring gear shim			
Thickness (mm)	**0.25** **0.40**	**0.30** **0.45**	**0.35** **0.50**

Thrust washer			
Thickness (mm)	**1.0** **1.3** **1.6** **1.9**	**1.1** **1.4** **1.7** **2.0**	**1.2** **1.5** **1.8** **2.1**

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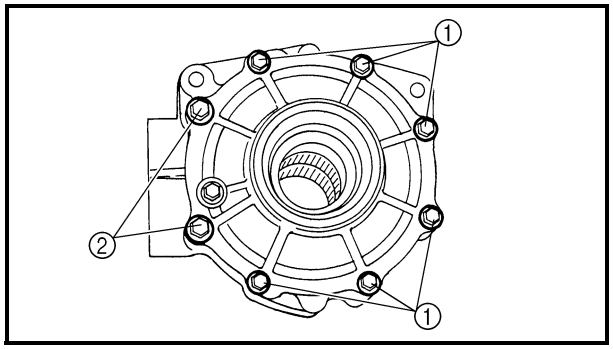
ASSEMBLING THE FINAL GEAR CASE

1. Adjust:
   - final gear lash
     Refer to “MEASURING AND ADJUSTING THE FINAL GEAR LASH”.

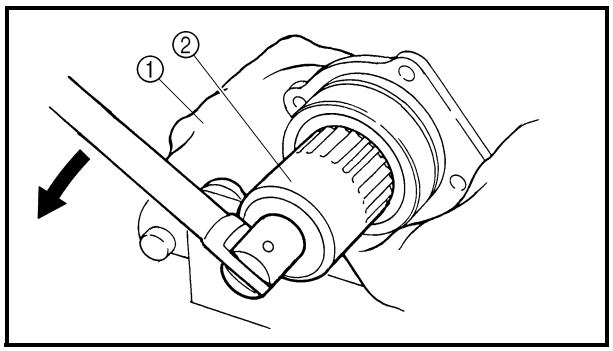


2. Install:
   - ring gear bearing housing
   - M8 bolts (ring gear bearing housing) ①

     23 Nm (2.3 m · kg, 17 ft · lb)
   - M10 bolts (ring gear bearing housing) ②

     40 Nm (4.0 m · kg, 29 ft · lb)

NOTE:
Apply Quick Gasket® to the bolts ① and ② threads.



3. Install:
   - bearing retainer

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a. Place a folded rag ①.
b. Secure the final drive pinion gear bearing housing edge in the vise.

NOTE:
Apply locking agent (LOCTITE®) to the threads of bearing retainer.

c. Attach the bearing retainer wrench ②.

Bearing retainer wrench
P/N. YM-04128, 90890-04128

d. Tighten the bearing retainer.

Bearing retainer
170 Nm (17.0 m · kg, 125 ft · lb)
LOCTITE®

CAUTION:
The bearing retainer has left-hand threads. Turn the retainer counterclockwise to tighten it.

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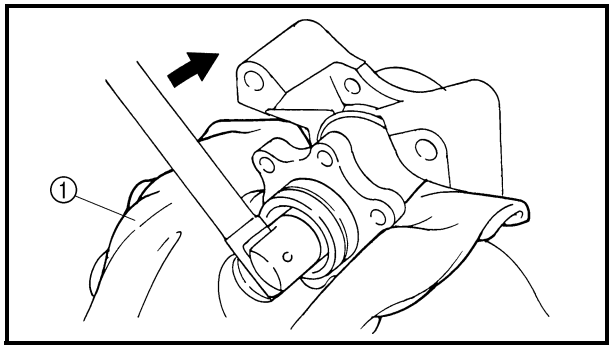

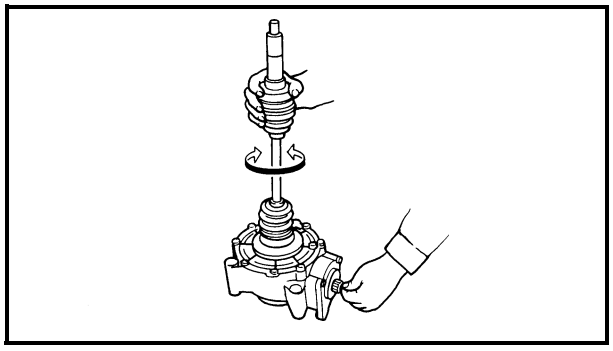

4. Install:
   • drive shaft coupling nut

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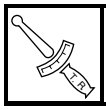
a. Place a folded rag ①.
b. Secure the drive shaft coupling edge in the vise.
c. Tighten the drive shaft coupling nut.

	**Drive shaft coupling nut** **80 Nm (8.0 m · kg, 58 ft · lb)**

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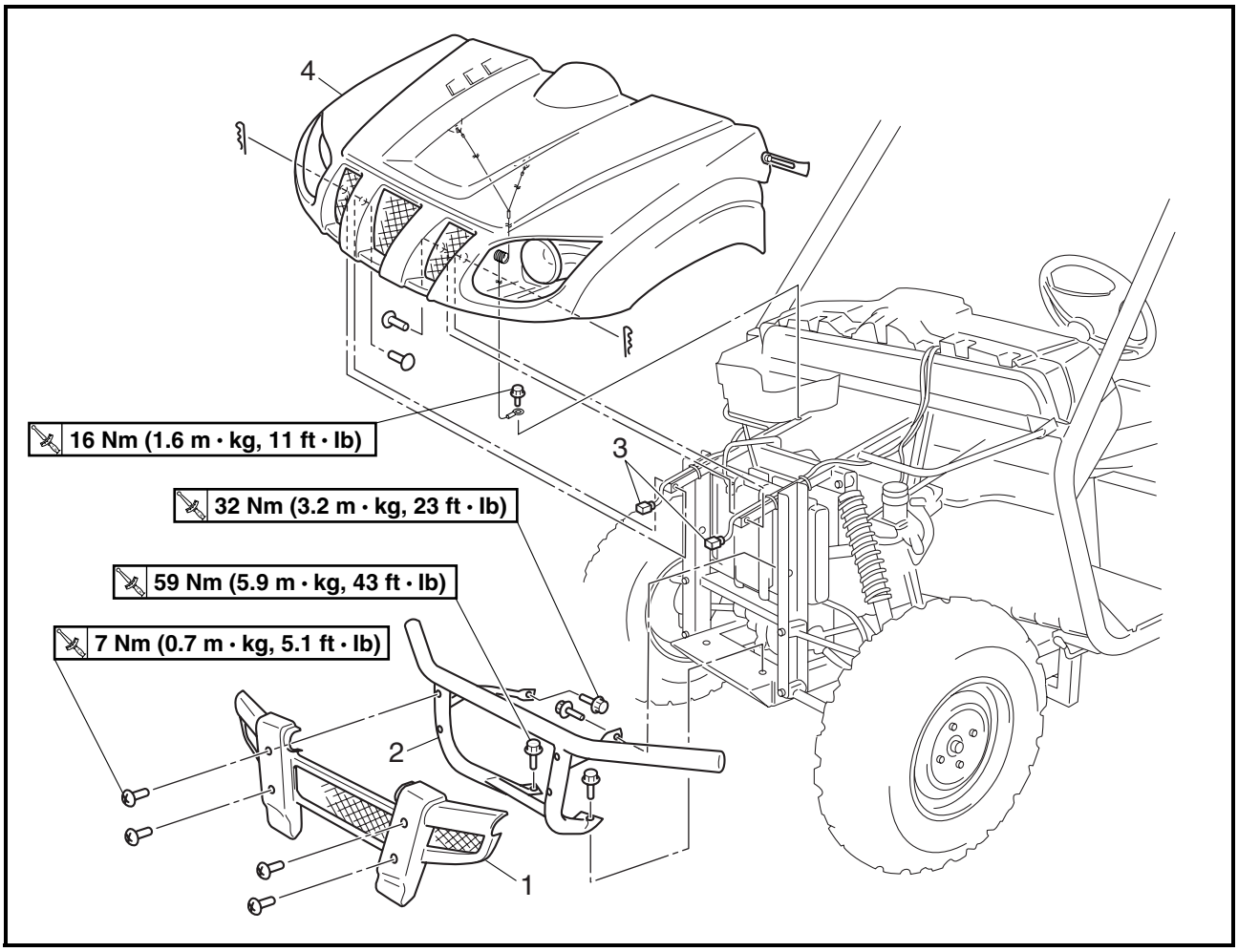
5. Check:
   • final drive gear operation
   Unsmooth operation → Replace the final drive gear assembly.
   Insert the double off-set joint into the final drive gear, and turn the gear back and forth.

CHASSIS

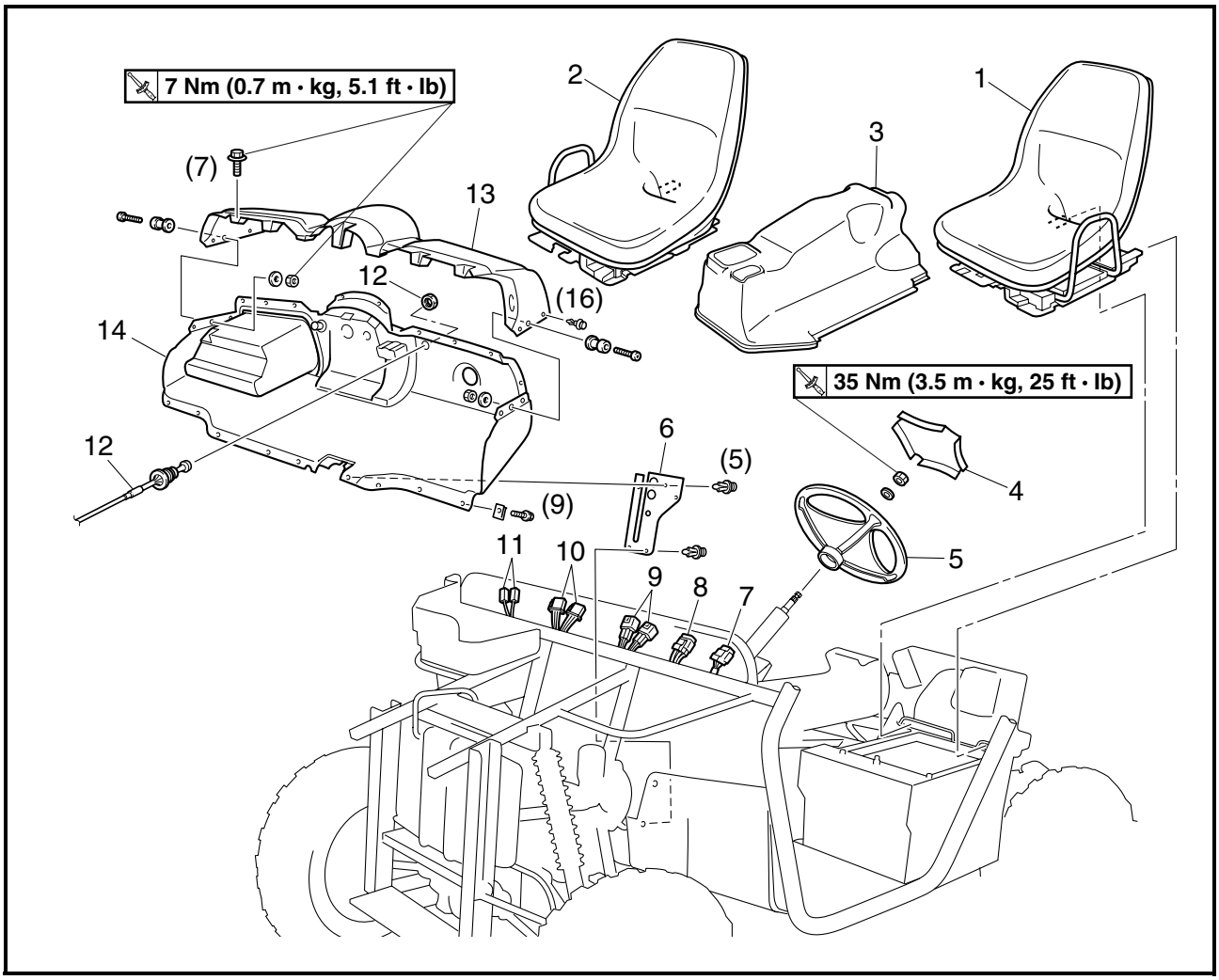
SEATS, ENCLOSURE, HOOD AND CARGO BED

FRONT BUMPER AND HOOD

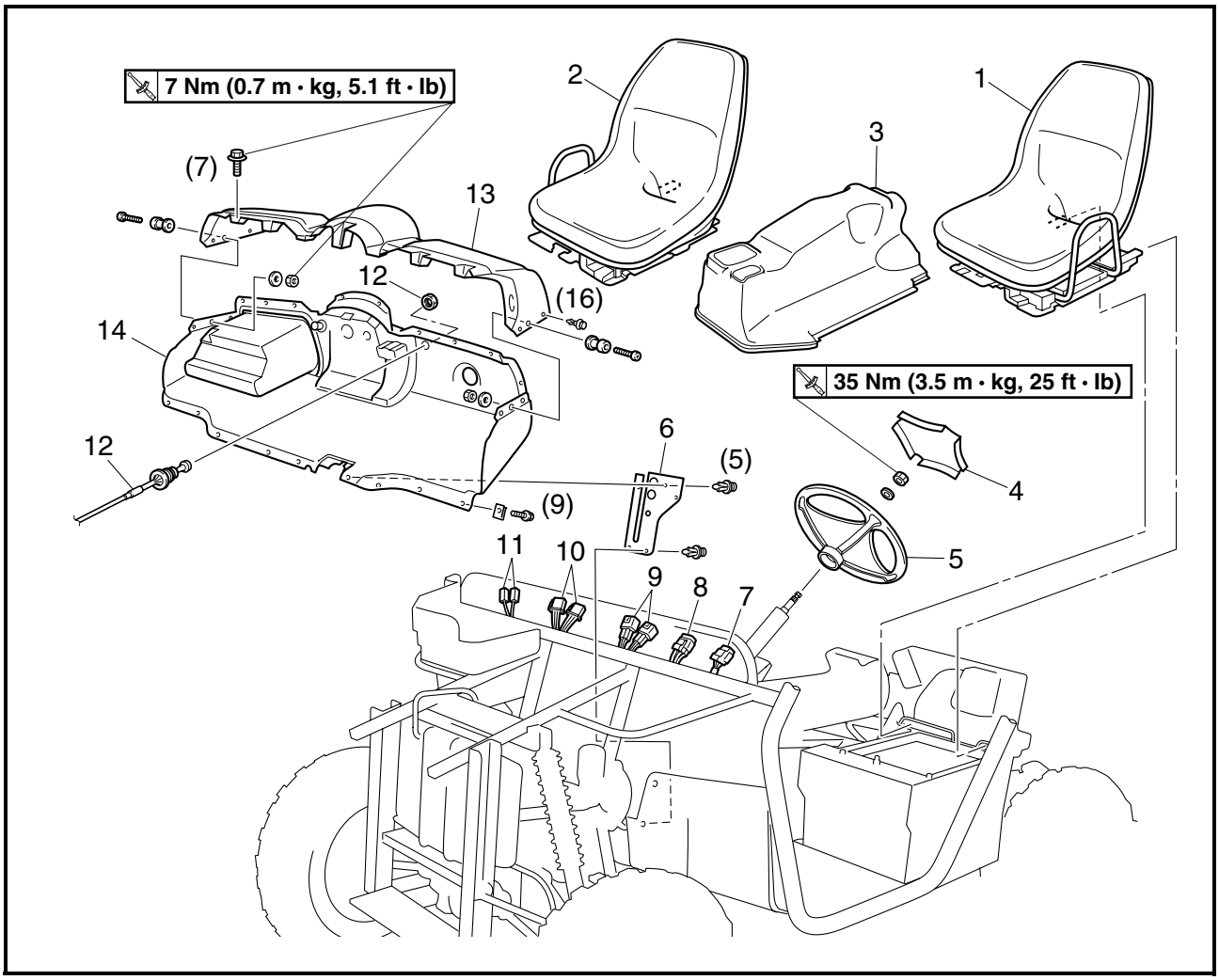


Order	Job/Part	Q'ty	Remarks
	Removing the front bumper and front fender		Remove the parts in the order listed.
1	Front bumper protector	1	
2	Front bumper	1	
3	Headlight coupler	2	Disconnect.
4	Hood	1	
			For installation, reverse the removal procedure.

SEATS, CONSOLE AND INSTRUMENT PANELS

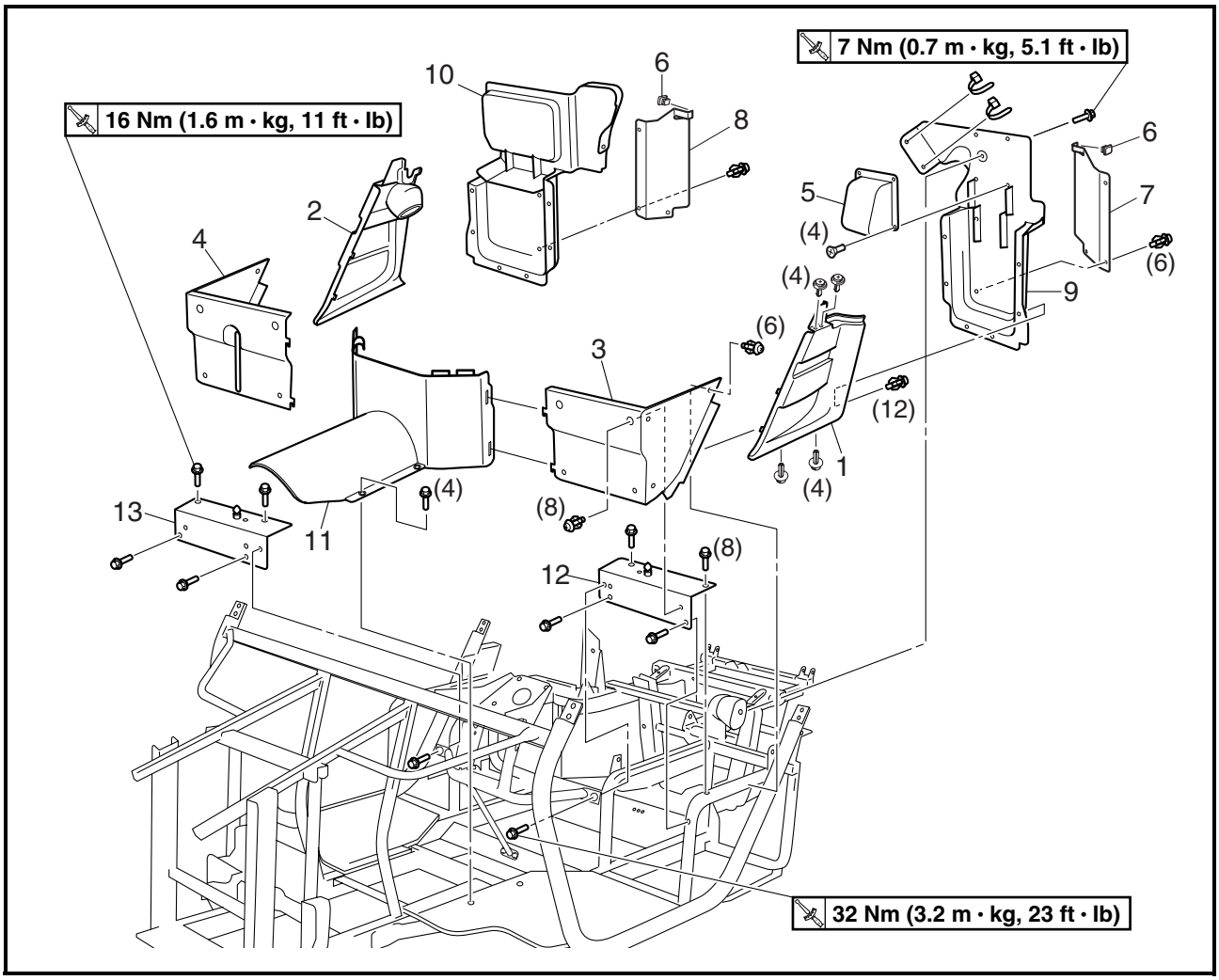


Order	Job/Part	Q'ty	Remarks
	Removing the seats, console and instrument panels		Remove the parts in the order listed.
1	Driver seat	1	
2	Passenger seat	1	
3	Console	1	
4	Steering wheel cover	1	
5	Steering wheel	1	
6	Pedal cover	1	
7	Light switch coupler	1	Disconnect.
8	Main switch coupler	1	Disconnect.
9	On-Command four-wheel drive switch and differential gear lock switch	2	Disconnect.
10	Indicator/warning light coupler	2	Disconnect.

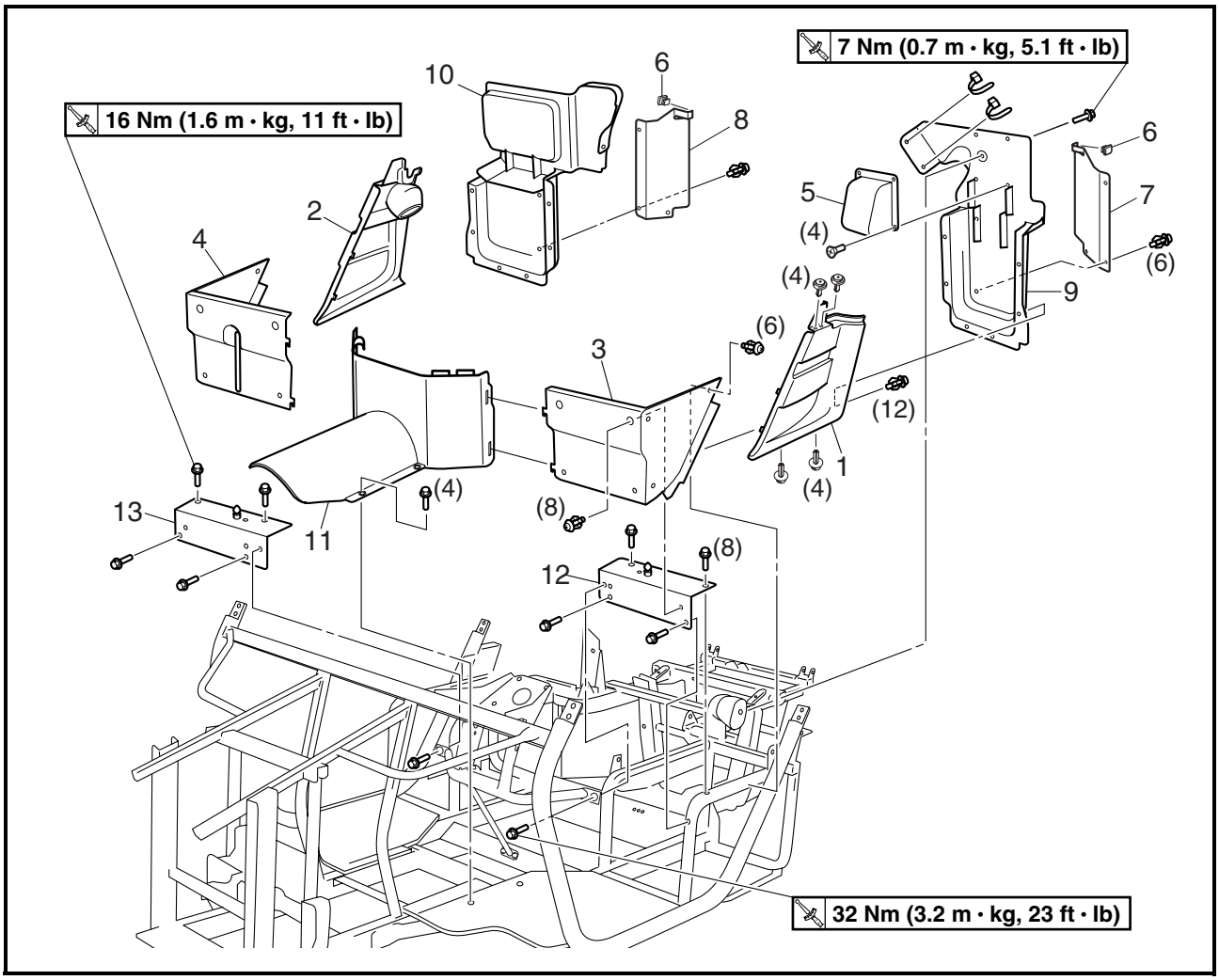


Order	Job/Part	Q'ty	Remarks
11	Auxiliary DC jack connector	2	Disconnect.
12	Nut/starter cable	1/1	
13	Upper instrument panel	1	
14	Lower instrument panel	1	
			For installation, reverse the removal procedure.

PANELS AND FOOTREST COVER

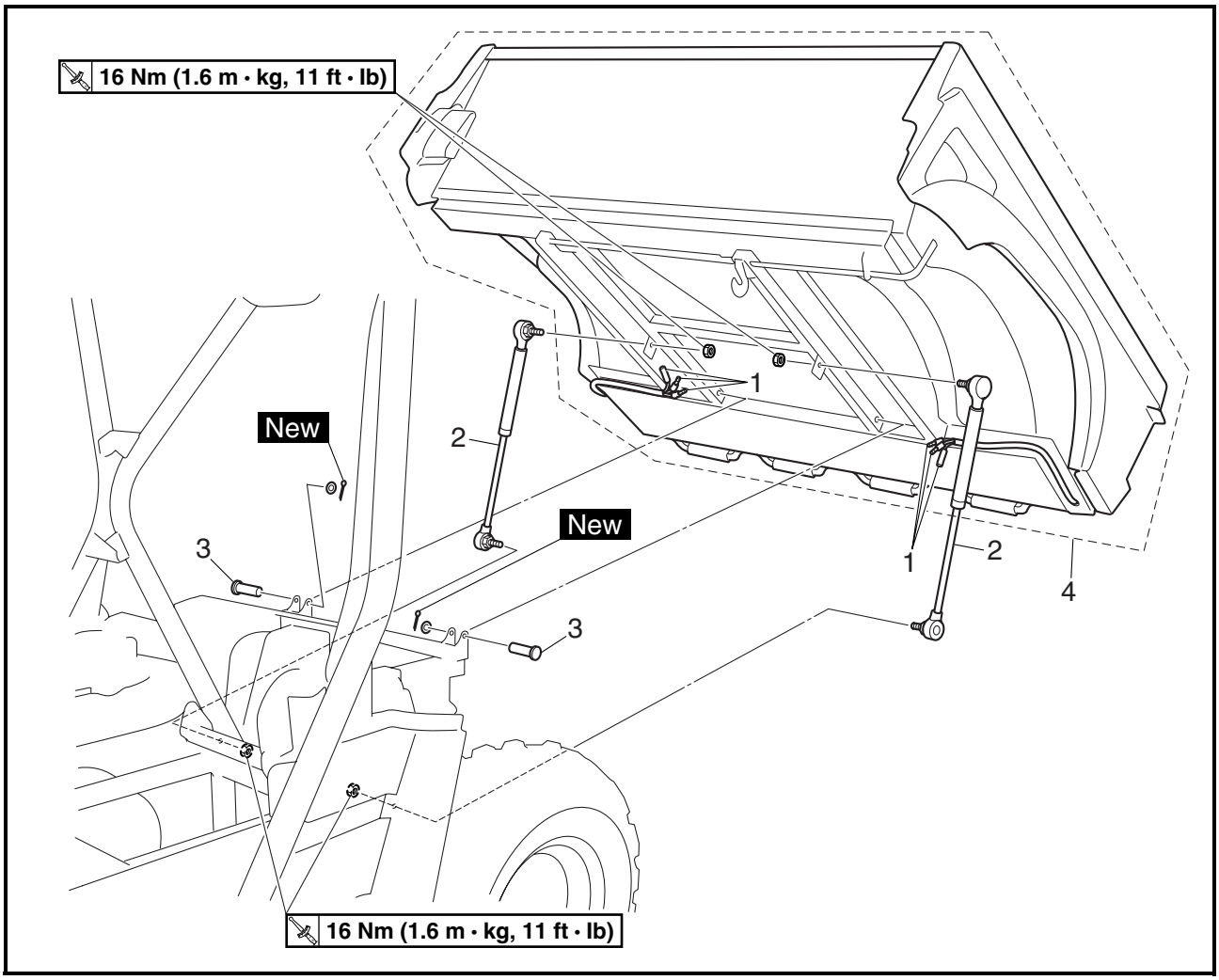


Order	Job/Part	Q'ty	Remarks
	Removing the panels and footrest cover		Remove the parts in the order listed.
1	Left side panel	1	
2	Right side panel	1	
3	Left corner panel	1	
4	Right corner panel	1	
5	Air duct end cover	1	
6	Protector cap	2	
7	Left protector 2	1	
8	Right protector 2	1	
9	Left protector 1	1	
10	Right protector 1	1	
11	Footrest cover	1	
12	Driver seat support	1	

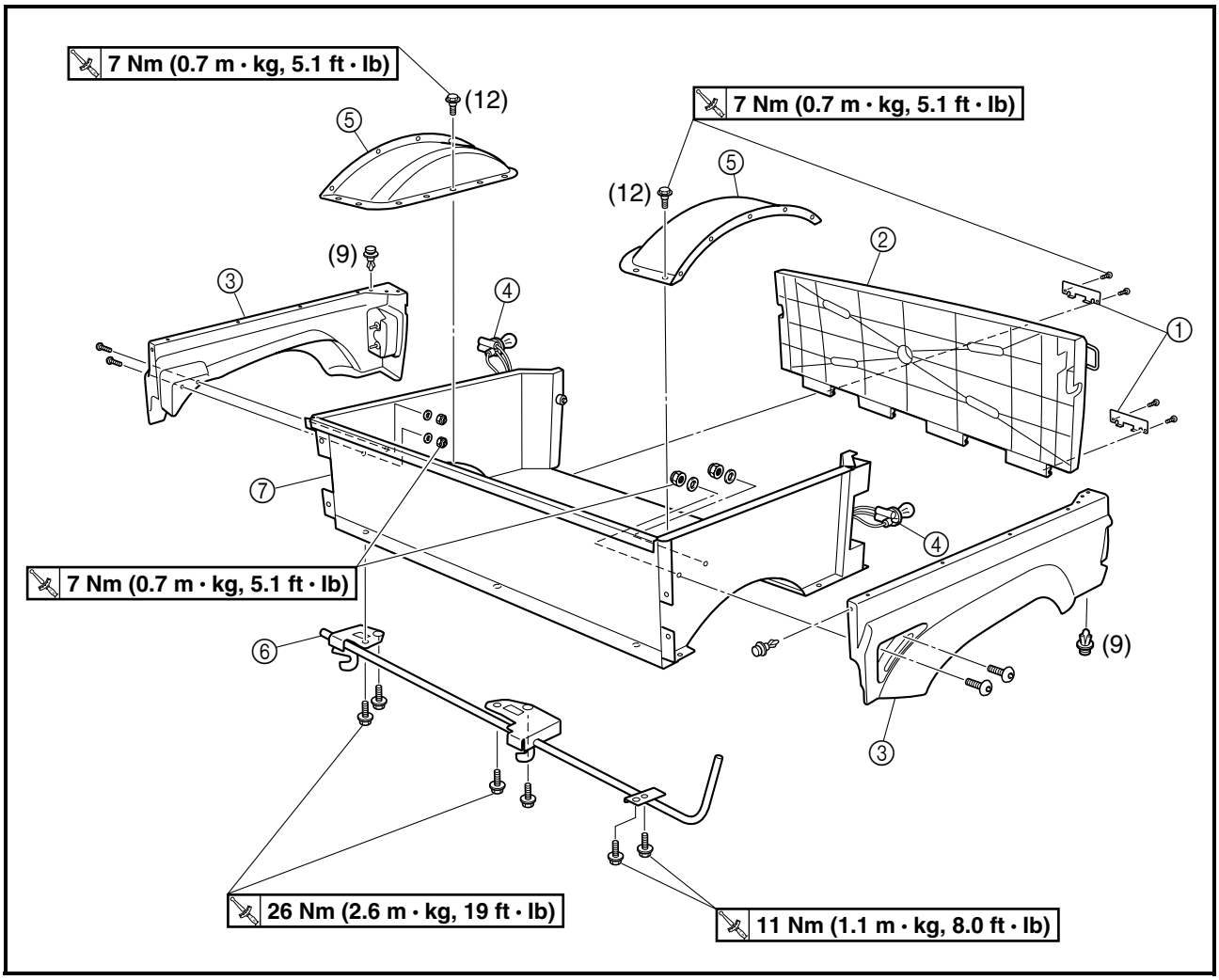


Order	Job/Part	Q'ty	Remarks
13	Passenger seat support	1	For installation, reverse the removal procedure.

CARGO BED

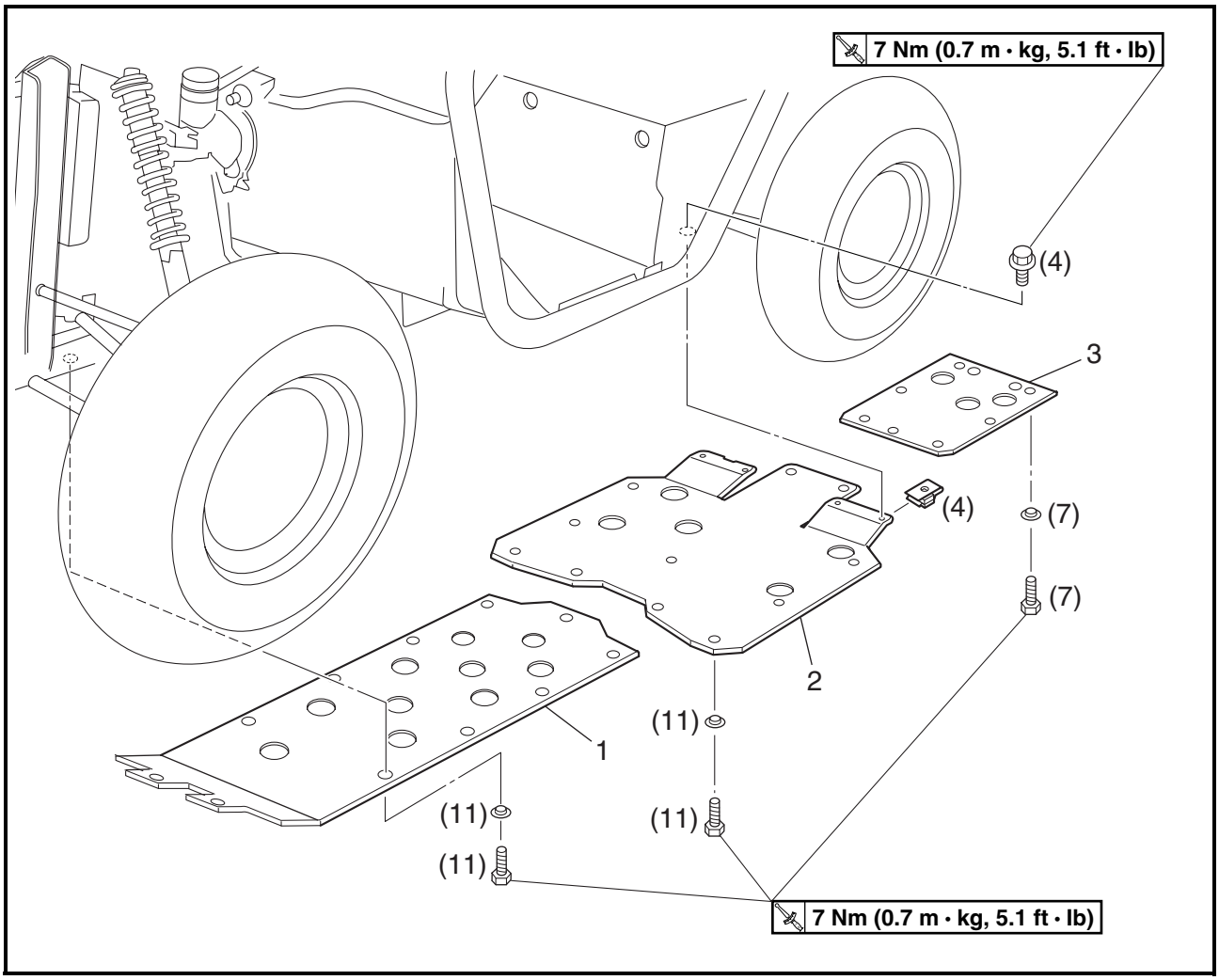


Order	Job/Part	Q'ty	Remarks
	Removing the cargo bed		Remove the parts in the order listed.
1	Tail/brake light connector	6	Disconnect.
2	Damper	2	
3	Pin	2	
4	Cargo bed assembly	1	
			For installation, reverse the removal procedure.



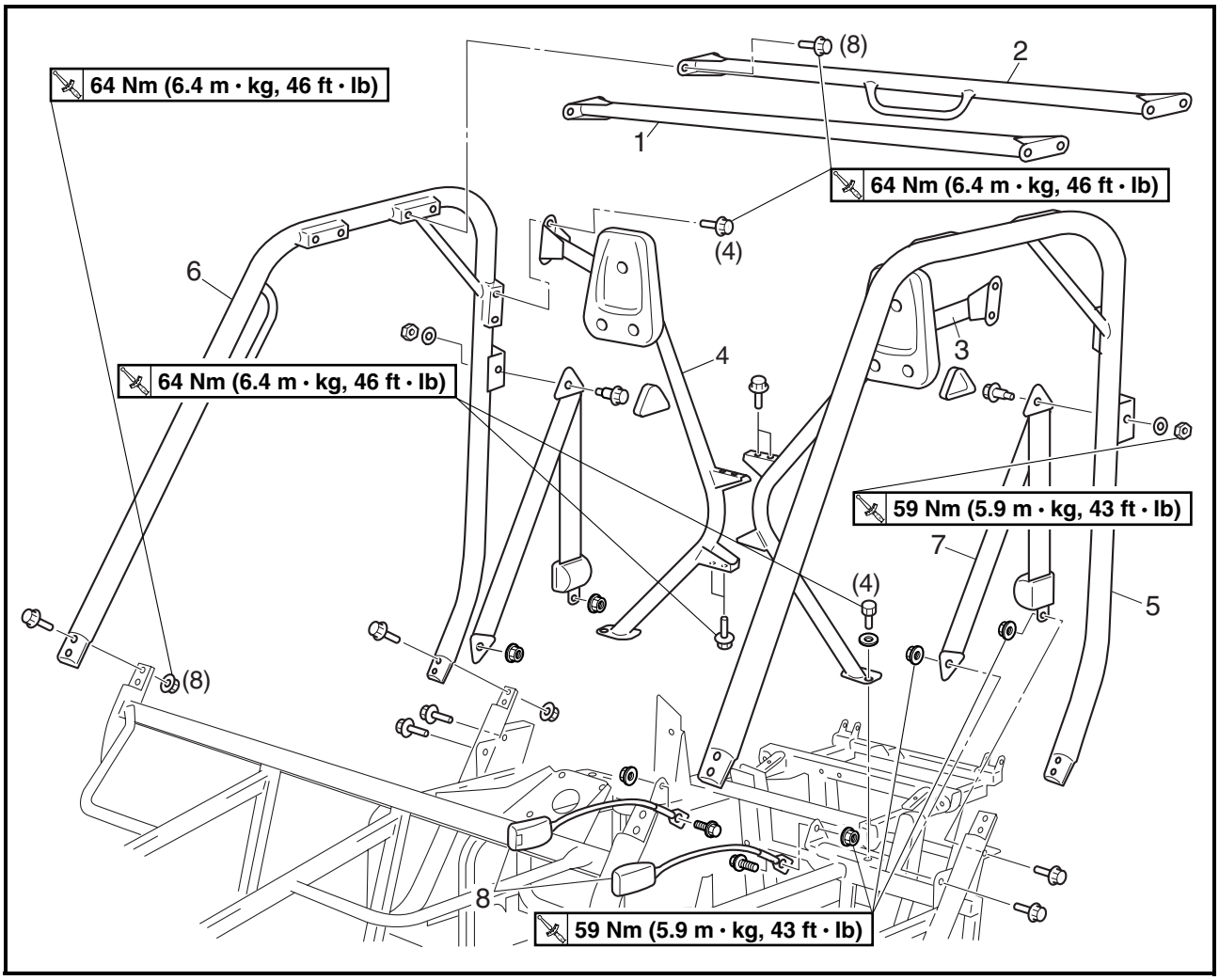
Order	Job/Part	Q'ty	Remarks
	Disassembling the cargo bed		Remove the parts in the order listed.
①	Hinge cover	2	
②	Tailgate	1	
③	Cargo bed panel	2	
④	Tail/brake light bulb holder	2	
⑤	Mud guard	2	
⑥	Cargo bed release lever	1	
⑦	Cargo bed	1	
			For assembly, reverse the disassembly procedure.

SKID PLATES



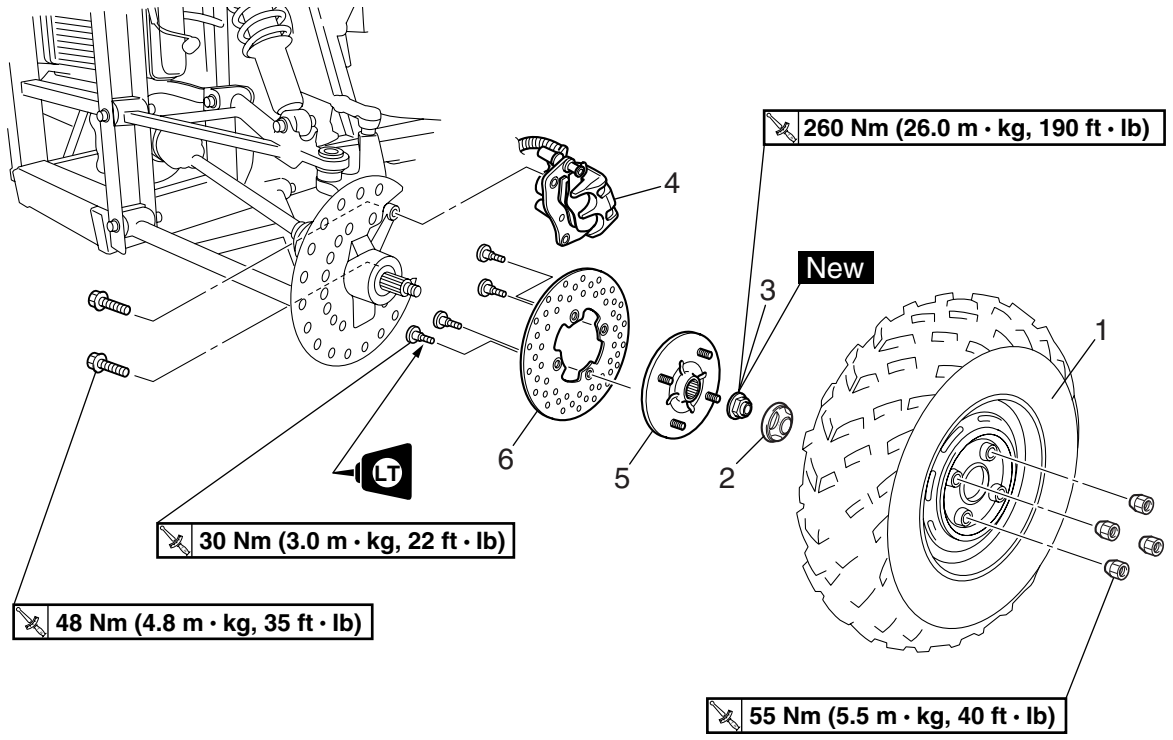
Order	Job/Part	Q'ty	Remarks
	Removing the engine skid plates		Remove the parts in the order listed.
1	Front skid plate	1	
2	Center skid plate	1	
3	Rear skid plate	1	
			For installation, reverse the removal procedure.

ENCLOSURE AND SEAT BELTS

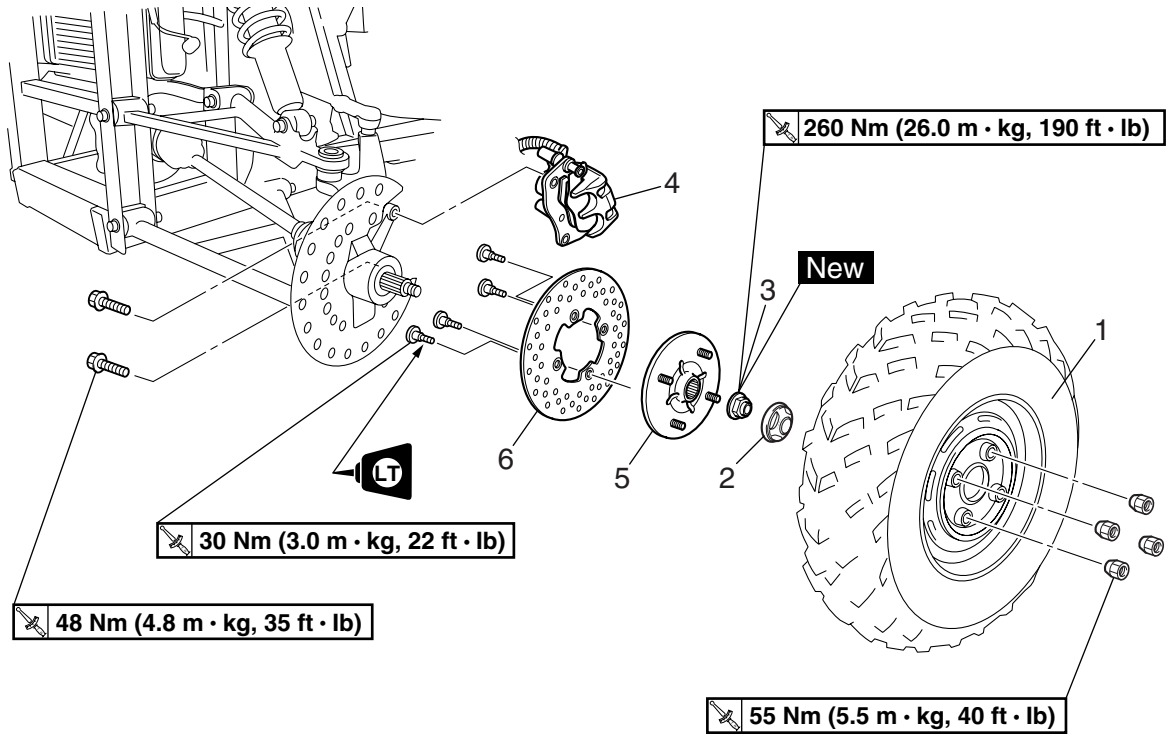


Order	Job/Part	Q'ty	Remarks
	Removing the enclosure and seat belts		Remove the parts in the order listed.
1	Front top frame	1	
2	Rear top frame	1	
3	Left support frame	1	
4	Right support frame	1	
5	Left side frame	1	
6	Right side frame	1	
7	Seat belt	2	
8	Buckle	2	
			For installation, reverse the removal procedure.

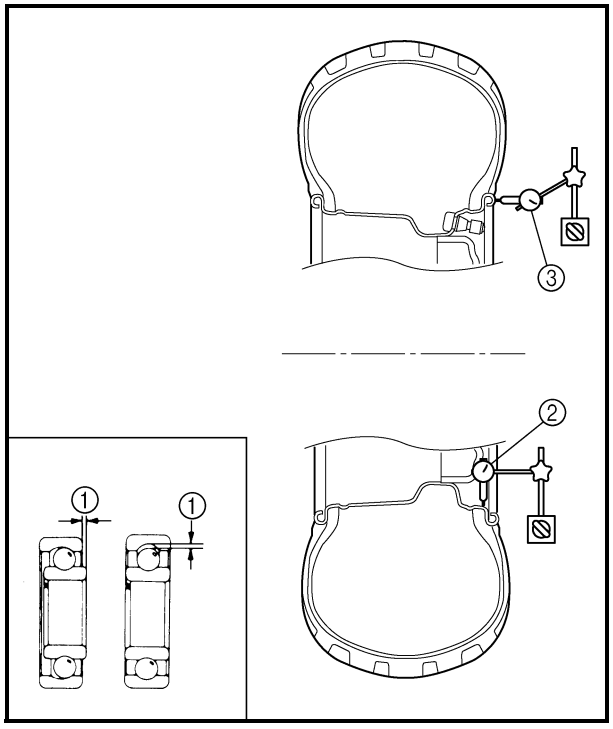
FRONT WHEELS AND BRAKE DISCS

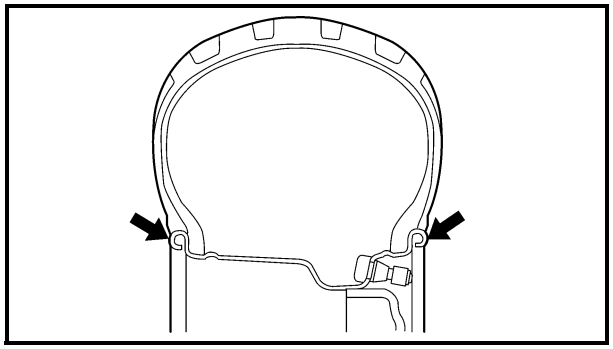


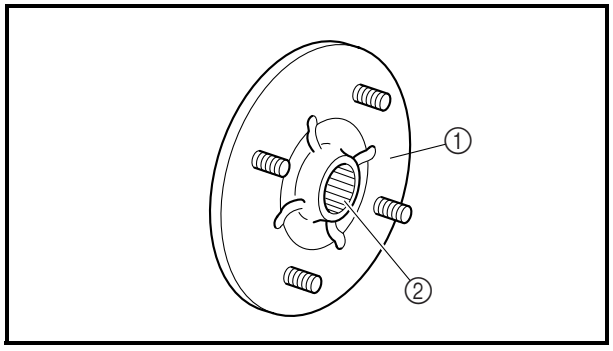
Order	Job/Part	Q'ty	Remarks
	Removing the front wheel		Remove the parts in the order listed. Place the vehicle on a level surface. **⚠ WARNING** **Securely support the vehicle so there is no danger of it falling over.**
1	Front wheel	1	Refer to "INSTALLING THE FRONT WHEEL".
2	Center cap	1	
3	Axle nut	1	Refer to "INSTALLING THE FRONT WHEEL HUB".



Order	Job/Part	Q'ty	Remarks
4	Brake caliper assembly	1	**NOTE:** Do not depress the brake pedal when the brake caliper is off of the brake disc as the brake pads will be forced shut.
5	Front wheel hub	1	
6	Brake disc	1	For installation, reverse the removal procedure.







CHECKING THE FRONT WHEEL

1. Check:
   - wheel
2. Measure:
   - wheel runout
     Over the specified limit → Replace the wheel or check the wheel bearing play ①.

Wheel runout limit
Radial ②: 2.0 mm (0.08 in)
Lateral ③: 2.0 mm (0.08 in)

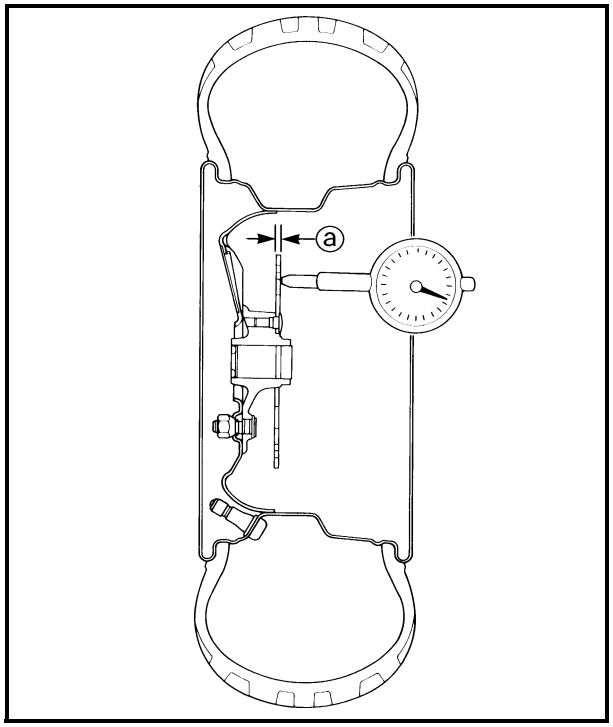
3. Check:
   - wheel balance
     Out of balance → Adjust.

⚠ WARNING

After replacing the tire, ride conservatively to allow the tire to be properly seated in the rim. Failure to do so may cause an accident resulting in vehicle damage and possible injury.

CHECKING THE FRONT WHEEL HUB

1. Check:
   - wheel hub ①
     Cracks/damage → Replace.
   - splines (wheel hub) ②
     Wear/damage → Replace.



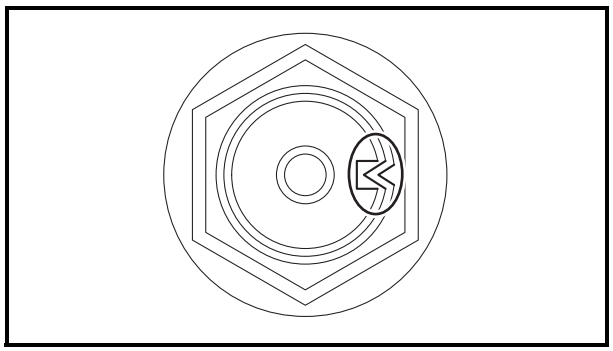
CHECKING THE FRONT BRAKE DISC

1. Check:
   - brake disc
     Galling/damage → Replace.
2. Measure:
   - brake disc deflection
     Out of specification → Check the wheel runout.
     If wheel runout is within the limits, replace the brake disc.

Brake disc maximum deflection
0.10 mm (0.004 in)

- brake disc thickness ⓐ
  Out of specification → Replace.

Brake disc minimum thickness
3.0 mm (0.12 in)



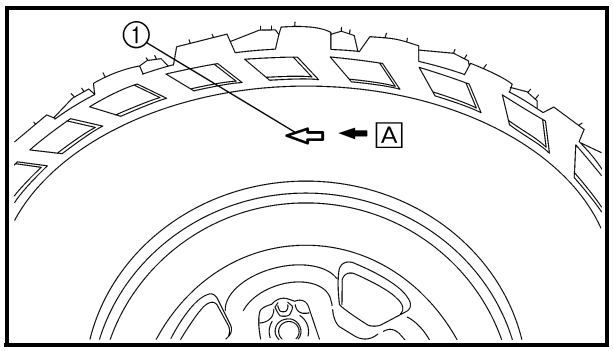
INSTALLING THE FRONT WHEEL HUB

1. Install:
   - axle nut New

260 Nm (26.0 m · kg, 190 ft · lb)

NOTE:

- Do not apply oil to the seat of the nut.
- After tightening the nut, stake the collar of the nut into the notch of the shaft.

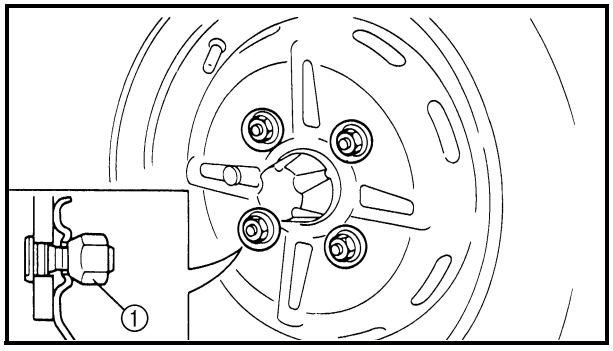


INSTALLING THE FRONT WHEEL

1. Install:
   - wheel

NOTE:

The arrow mark ① on the tire must point in the direction of rotation A of the wheel.



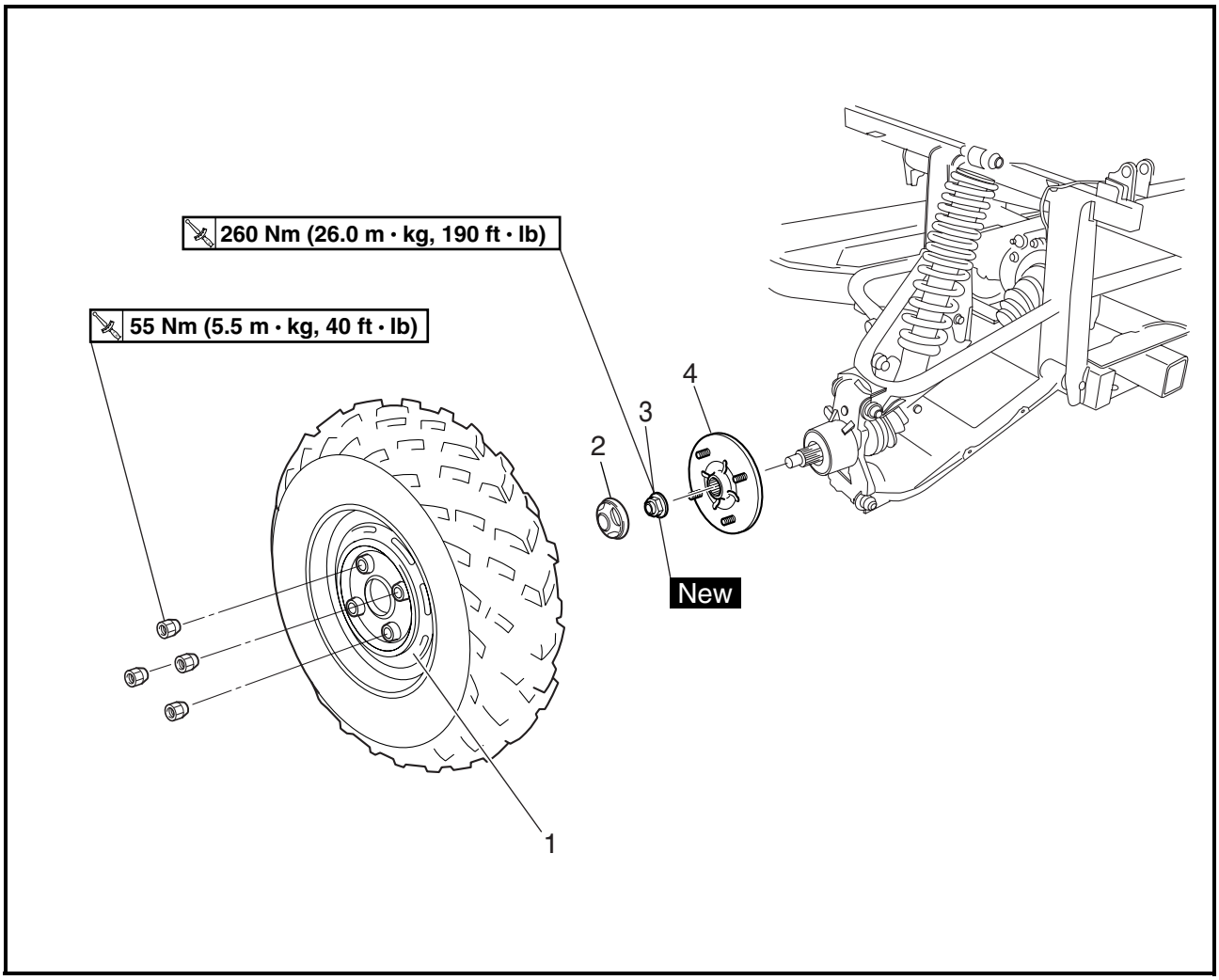
2. Tighten:
   - wheel nuts ①

⚠ WARNING

Tapered wheel nuts ① are used for both the front and rear wheels. Install each nut with its tapered side towards the wheel.

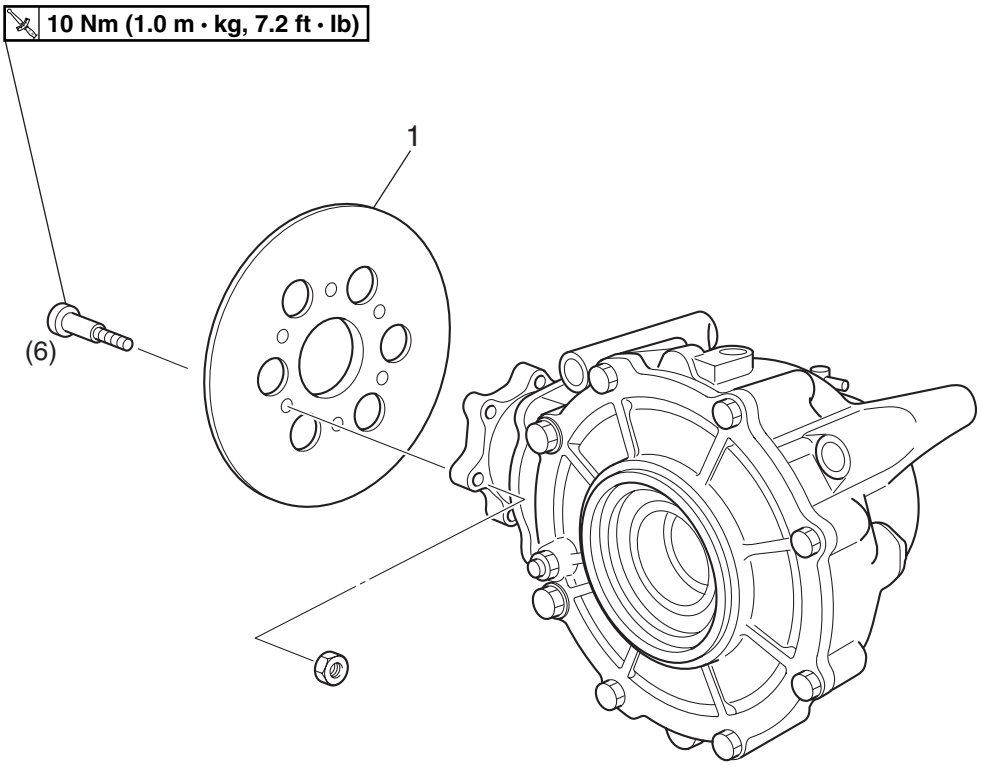
REAR WHEELS AND BRAKE DISC

REAR WHEELS



Order	Job/Part	Q'ty	Remarks
	Removing the rear wheel		Remove the parts in the order listed. Place the vehicle on a level surface. **⚠ WARNING** **Securely support the vehicle so there is no danger of it falling over.**
1	Rear wheel	1	Refer to "INSTALLING THE REAR WHEEL".
2	Center cap	1	
3	Axle nut	1	Refer to "INSTALLING THE REAR WHEEL HUB".
4	Rear wheel hub	1	For installation, reverse the removal procedure.

REAR BRAKE DISC



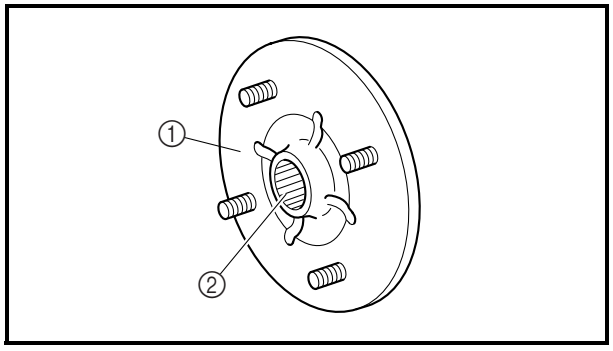
Order	Job/Part	Q'ty	Remarks
	Removing the rear brake disc		Remove the parts in the order listed.
	Brake caliper assembly		Refer to "FRONT AND REAR BRAKES".
	Final drive gear		Refer to "REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE SHAFT" in chapter 7.
1	Rear brake disc	1	For installation, reverse the removal procedure.

CHECKING THE REAR WHEEL

1. Check:
   - wheel
     Refer to "CHECKING THE FRONT WHEEL".
2. Measure:
   - wheel runout
     Refer to "CHECKING THE FRONT WHEEL".
     Over the specified limit → Replace.

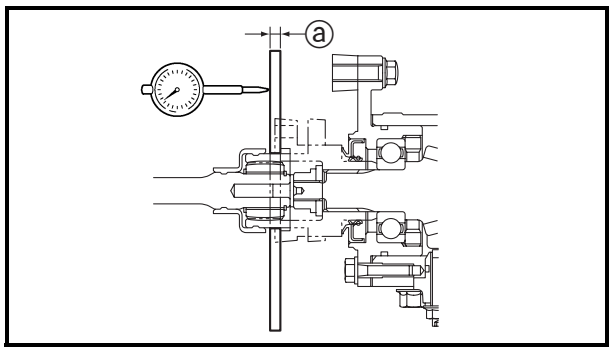
Wheel runout limit
Radial: 2.0 mm (0.08 in)
Lateral: 2.0 mm (0.08 in)

3. Check:
   - wheel balance
     Refer to "CHECKING THE FRONT WHEEL".
     Out of balance → Adjust.



CHECKING THE REAR WHEEL HUB

1. Check:
   - wheel hub ①
     Cracks/damage → Replace.
   - splines (wheel hub) ②
     Wear/damage → Replace.



CHECKING THE REAR BRAKE DISC

1. Check:
   - brake disc
     Galling/damage → Replace.
2. Measure:
   - brake disc deflection
     Out of specification → Replace.

Brake disc maximum deflection
0.10 mm (0.004 in)

   - brake disc thickness ⓐ
     Out of specification → Replace.

Brake disc minimum thickness
4.5 mm (0.18 in)

INSTALLING THE REAR WHEEL HUB

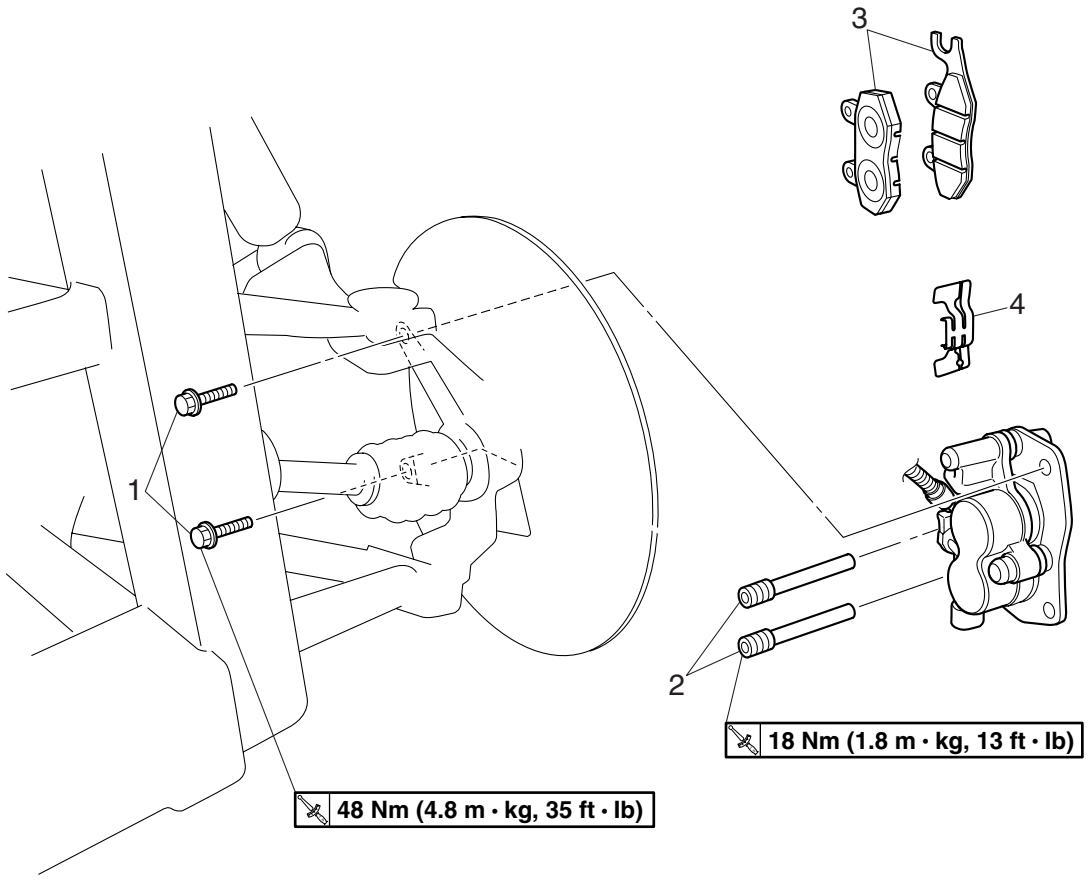
1. Install:
   - axle nut New
     Refer to "INSTALLING THE FRONT WHEEL HUB".

INSTALLING THE REAR WHEEL

1. Install:
   - wheel
     Refer to "INSTALLING THE FRONT WHEEL".
2. Tighten:
   - wheel nuts
     Refer to "INSTALLING THE FRONT WHEEL".

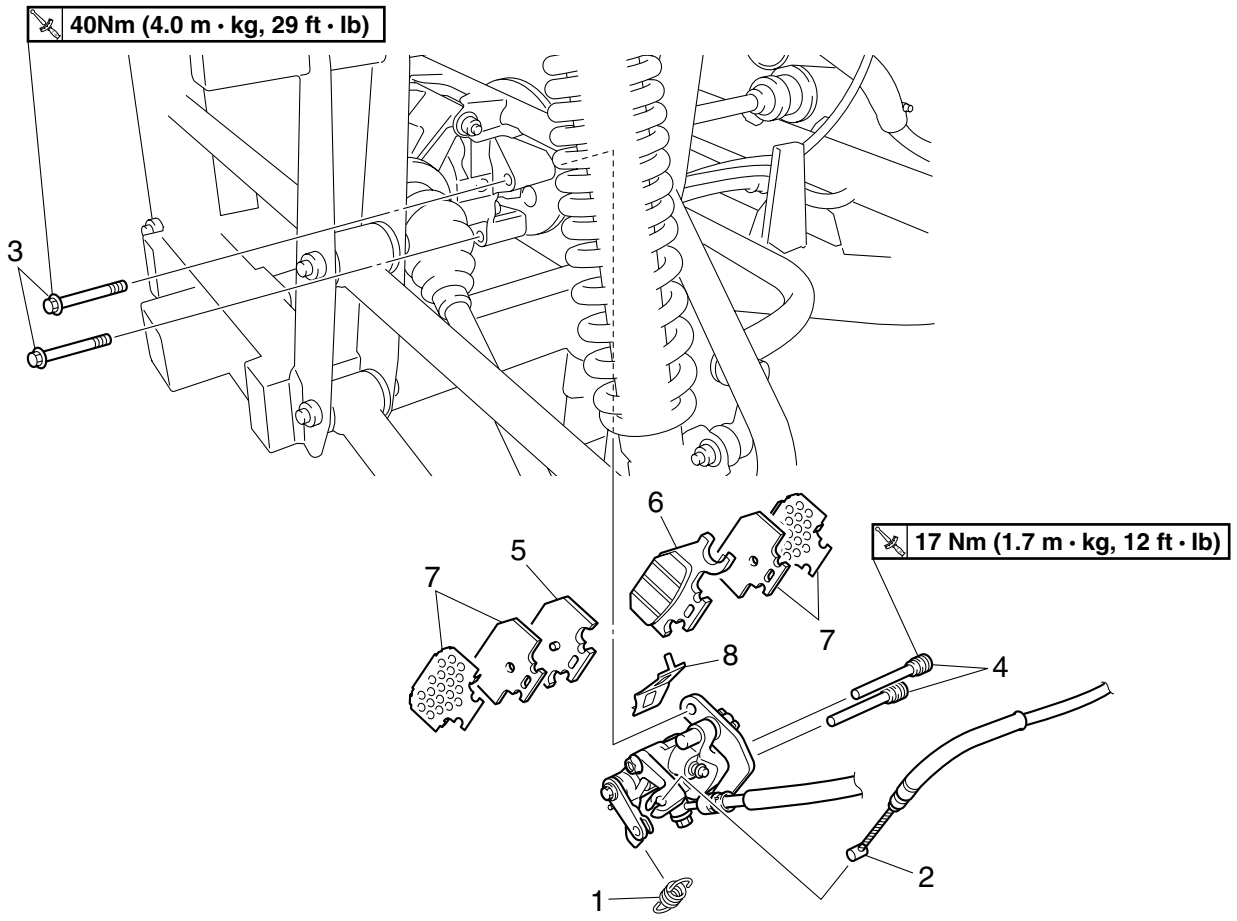
FRONT AND REAR BRAKES

FRONT BRAKE PADS



Order	Job/Part	Q'ty	Remarks
	Removing the front brake pads		Remove the parts in the order listed.
	Front wheel		Refer to "FRONT WHEELS AND BRAKE DISCS".
1	Brake caliper mounting bolt	2	
2	Brake pad holding bolt	2	Refer to "REPLACING THE FRONT BRAKE PADS".
3	Brake pad	2	
4	Pad spring	1	
			For installation, reverse the removal procedure.

REAR BRAKE PADS

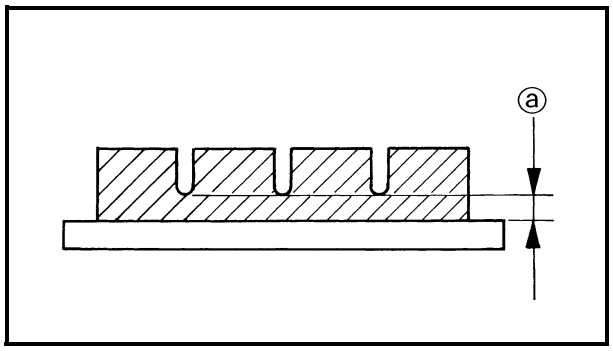


Order	Job/Part	Q'ty	Remarks
	Removing the rear brake pads		Remove the parts in the order listed.
	Rear skid plate		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED".
1	Spring	1	
2	Parking brake cable	1	
3	Brake caliper mounting bolt	2	
4	Brake pad holding bolt	2	Refer to "REPLACING THE REAR BRAKE PADS".
5	Brake pad (piston side)	1	
6	Brake pad	1	
7	Insulator/pad shim	2/2	
8	Pad spring	1	
			For installation, reverse the removal procedure.

CAUTION:

Disc brake components rarely require disassembly. DO NOT:

- **disassemble components unless absolutely necessary;**
- **use solvents on internal brake components;**
- **use spent brake fluid for cleaning; (use only clean brake fluid)**
- **allow brake fluid to come in contact with the eyes, as this may cause eye injury;**
- **splash brake fluid onto painted surfaces or plastic parts, as this may cause damage;**
- **disconnect any hydraulic connection, as this would require the entire brake system to be disassembled, drained, cleaned, properly filled and bled after reassembly.**



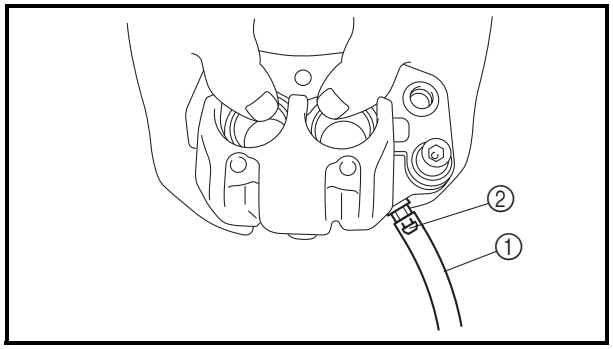
REPLACING THE FRONT BRAKE PADS

NOTE:

It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.

1. Measure:
   - brake pad wear limit ⓐ
     Out of specification → Replace the brake pads as a set.

	Brake pad wear limit **1.5 mm (0.06 in)**



2. Install:
   • brake pads
   • brake pad spring

NOTE:
Always install new brake pads and brake pad spring as a set.

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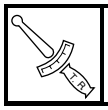
a. Connect a suitable hose ① tightly to the brake caliper bleed screw ②. Put the other end of this hose into an open container.
b. Loosen the brake caliper bleed screw and, using a finger, push the caliper piston into the brake caliper.
c. Tighten the brake caliper bleed screw.

	**Brake caliper bleed screw** **6 Nm (0.6 m · kg, 4.3 ft · lb)**

d. Install the retaining bolts and brake caliper.

	Brake pad holding bolt **18 Nm (1.8 m · kg, 13 ft · lb)** **Brake caliper mounting bolt** **48 Nm (4.8 m · kg, 35 ft · lb)**

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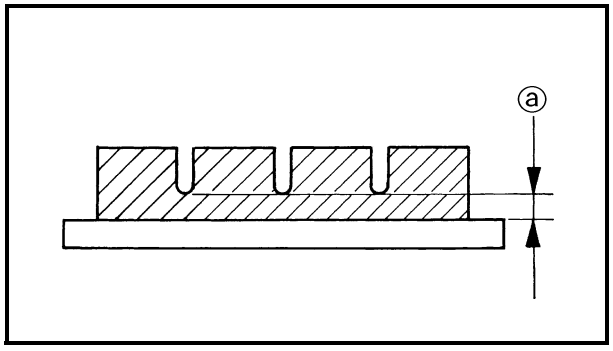
3. Check:
   • brake fluid level
   Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.
4. Check:
   • brake pedal operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

REPLACING THE REAR BRAKE PADS

NOTE:
It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.



1. Measure:
   • brake pad wear limit ⓐ
   Out of specification → Replace the brake pads as a set.

Brake pad wear limit
1.5 mm (0.06 in)

2. Install:
   • brake pads
   • brake pad spring

NOTE:
Always install new brake pads, new brake pad shims, new insulators, and a new brake pad spring as a set.

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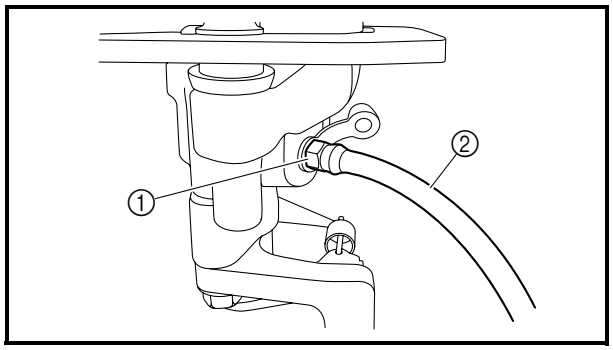
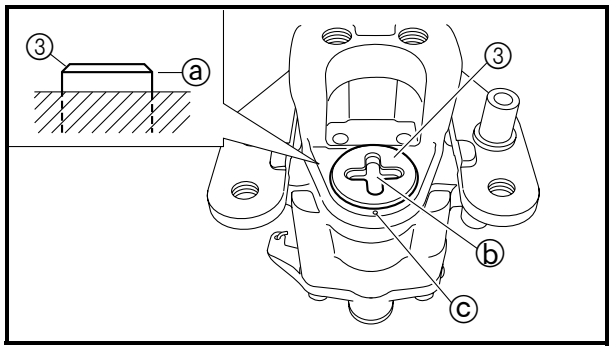


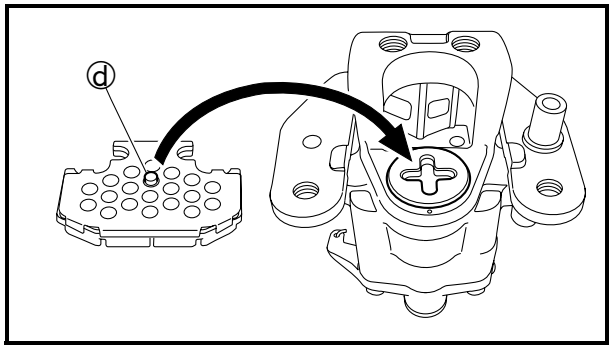
a. Connect a suitable hose ① tightly to the brake caliper bleed screw ②. Put the other end of this hose into an open container.
b. Loosen the brake caliper bleed screw, and then turn the brake caliper piston ③ clockwise until section ⓐ of the brake caliper piston is level with the surface of the brake caliper body.

NOTE:
Align an end ⓑ of the groove in the brake caliper piston with the punch mark ⓒ on the brake caliper body.



c. Tighten the brake caliper bleed screw.

Brake caliper bleed screw
5 Nm (0.5 m · kg, 3.6 ft · lb)



d. Install new brake pads, new insulators, new brake pad shims and a new brake pad spring.

NOTE:
Align the projection ⓓ on the piston side of the brake pad with the groove in the brake caliper piston.

e. Install the brake pad holding bolts, the brake caliper, and the brake caliper mounting bolts.

Brake pad holding bolt
17 Nm (1.7 m · kg, 12 ft · lb)
Brake caliper mounting bolt
40 Nm (4.0 m · kg, 29 ft · lb)

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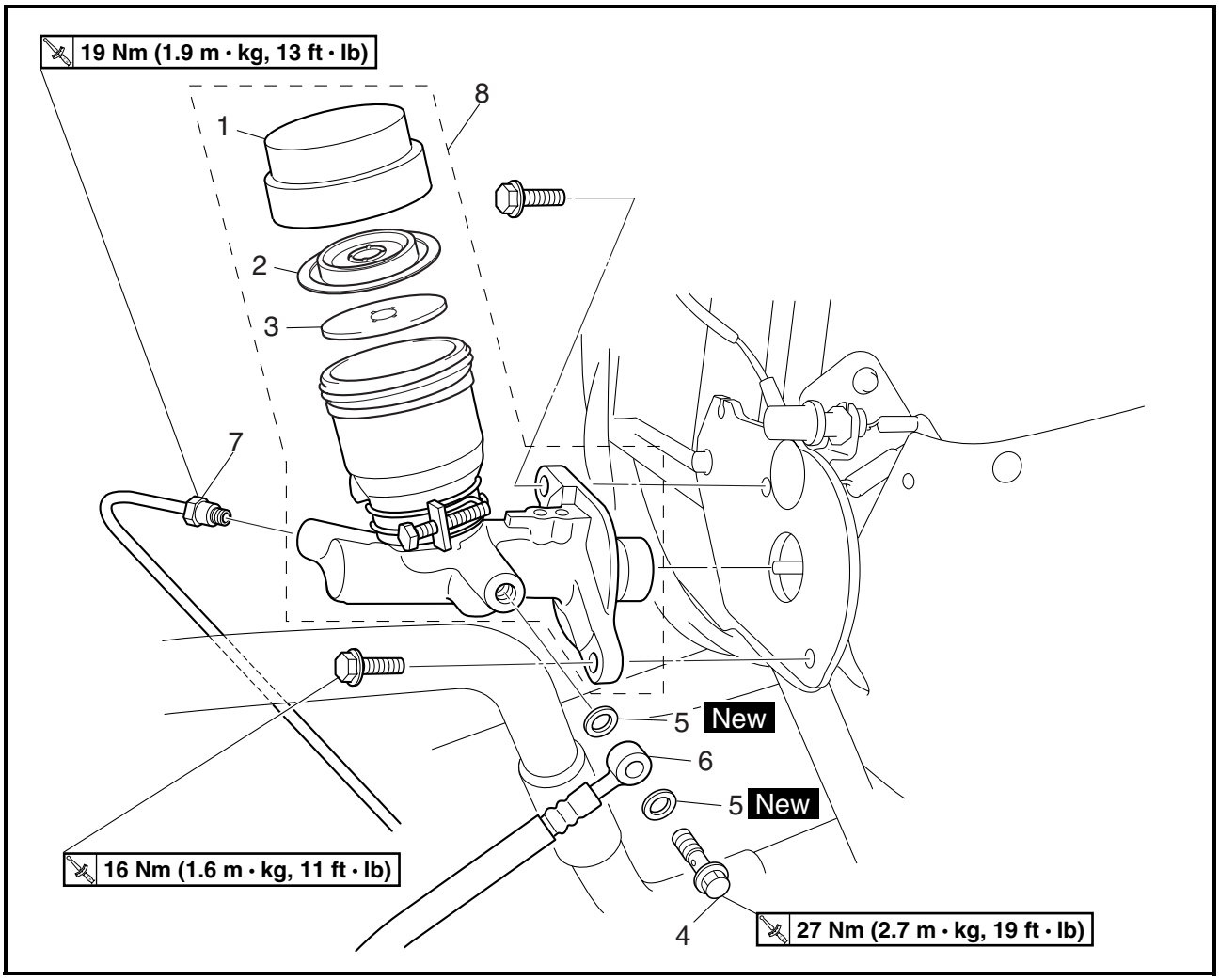
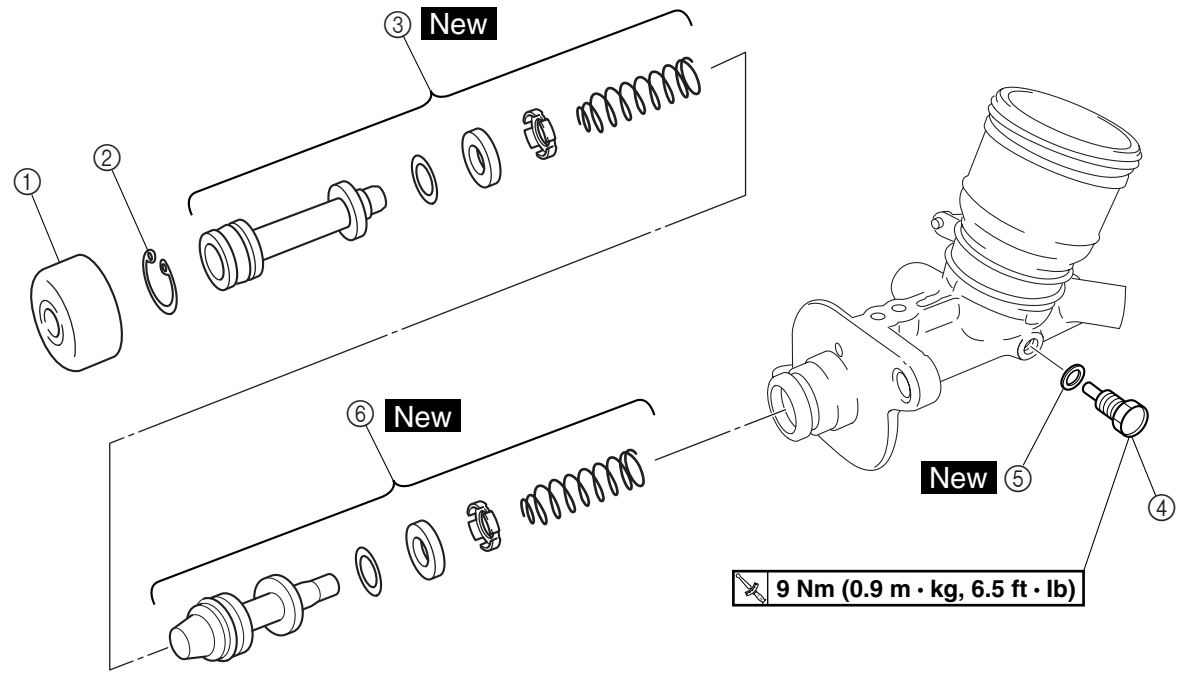
3. Check:
   - brake fluid level
     Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.
4. Check:
   - brake pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

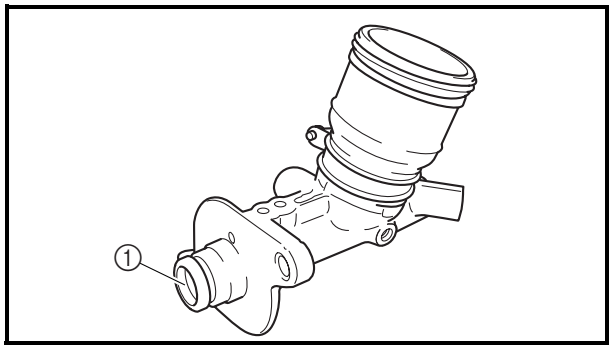
BRAKE MASTER CYLINDER

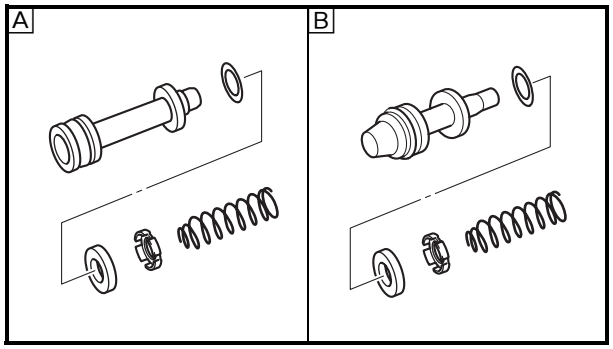


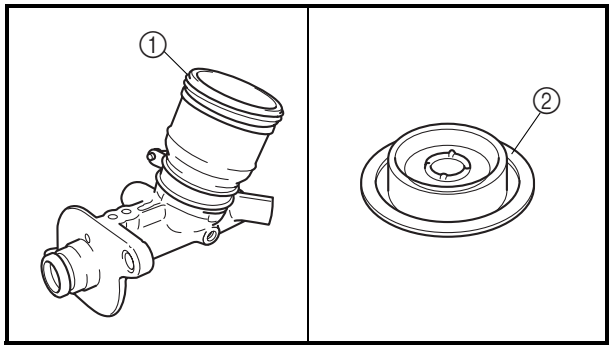
Order	Job/Part	Q'ty	Remarks
	Removing the brake master cylinder		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm	1	
3	Brake fluid reservoir float	1	
4	Union bolt	1	
5	Copper washer	2	Refer to "INSTALLING THE BRAKE MASTER CYLINDER".
6	Brake hose	1	Disconnect.
7	Brake pipe	1	Disconnect.
8	Brake master cylinder	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the brake master cylinder		Remove the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Primary brake master cylinder kit	1	
④	Secondary brake master cylinder kit stopper	1	Refer to "ASSEMBLING THE BRAKE MASTER CYLINDER".
⑤	Gasket	1	
⑥	Secondary brake master cylinder kit	1	
			For assembly, reverse the disassembly procedure.







CHECKING THE MASTER CYLINDER

1. Check:
   - brake master cylinder ①
     Wear/scratches → Replace the brake master cylinder assembly.
   - brake master cylinder body
     Cracks/damage → Replace.
   - brake fluid delivery passage
     (brake master cylinder body)
     Blockage → Blow out with compressed air.
2. Check:
   - brake master cylinder kit
     Scratches/wear/damage → Replace as a set.

A Primary brake master cylinder kit
B Secondary brake master cylinder kit

3. Check:
   - brake fluid reservoir ①
   - brake fluid reservoir diaphragm ②
     Cracks/damage → Replace.

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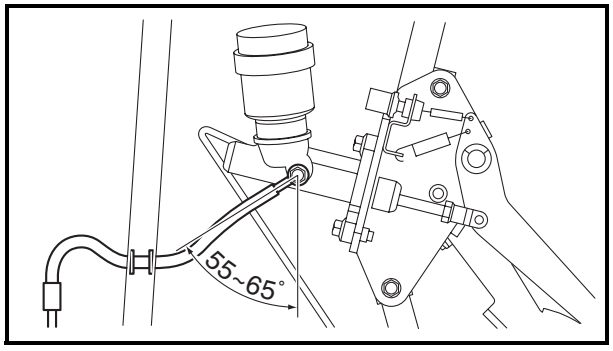
ASSEMBLING THE BRAKE MASTER CYLINDER

⚠ WARNING

- **All internal brake components should be cleaned and lubricated with new brake fluid only before installation.**

Recommended brake fluid
DOT 4

- **Whenever a master cylinder is disassembled, replace the piston seals and dust seals.**



INSTALLING THE BRAKE MASTER CYLINDER

1. Install:
   - brake master cylinder

     16 Nm (1.6 m · kg, 11 ft · lb)
2. Install:
   - brake pipe — **19 Nm (1.9 m · kg, 13 ft · lb)**
   - copper washers New
   - brake hose
   - union bolt — **27 Nm (2.7 m · kg, 19 ft · lb)**

NOTE:
Tighten the union bolt while holding the brake hose as shown.

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" in chapter 2.

3. Fill:
   - brake fluid reservoir

Recommended brake fluid
DOT 4

CAUTION:

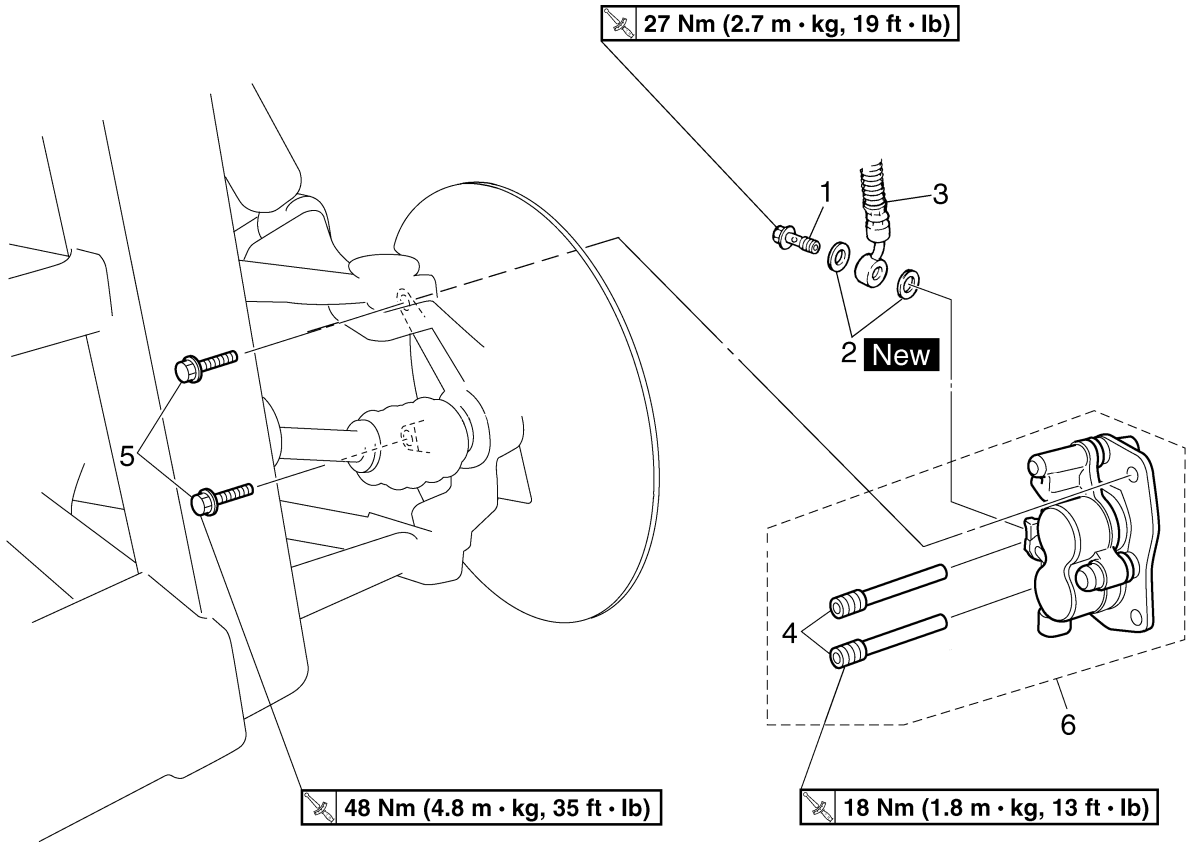
Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

⚠ WARNING

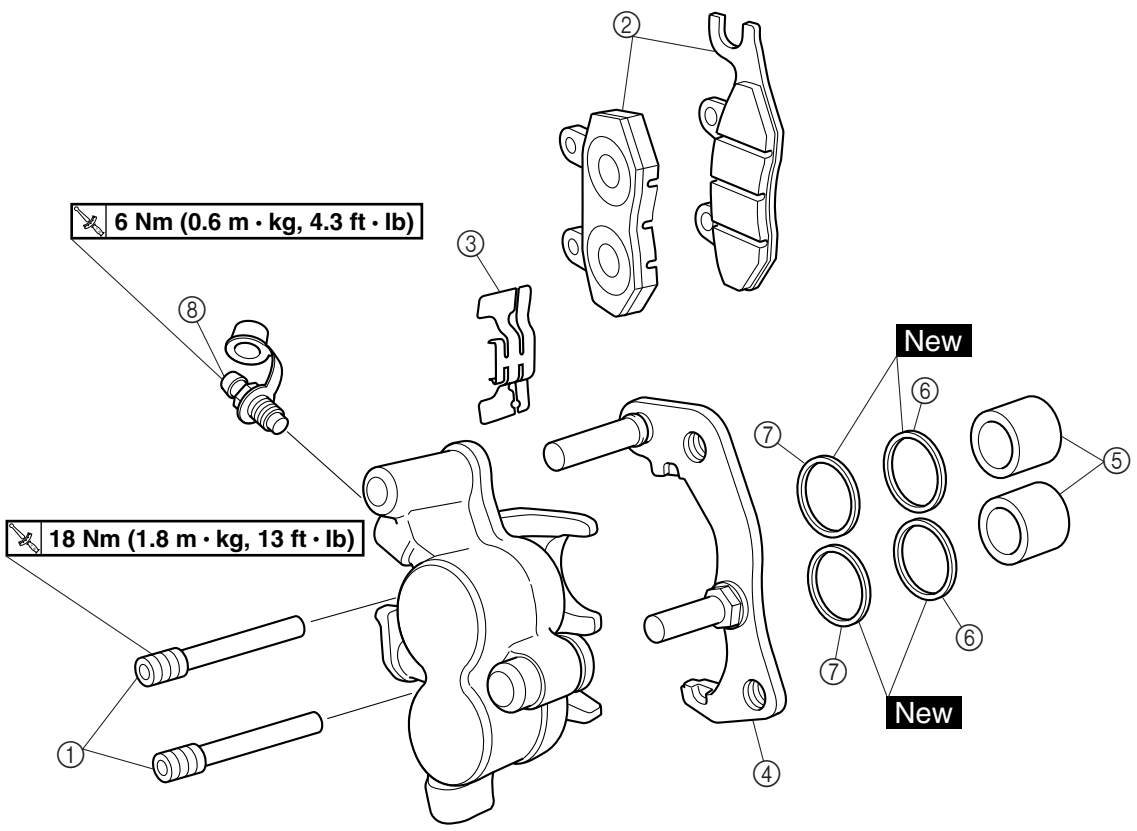
- **Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.**
- **Be careful that water does not enter the brake master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.**

4. Air bleed:
   • brake system
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.
5. Check:
   • brake fluid level
   Brake fluid level is under the “MIN” level line
   → Fill up.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.
6. Adjust:
   • brake pedal free play
   Refer to “ADJUSTING THE BRAKE PEDAL” in chapter 3.

FRONT BRAKE CALIPER

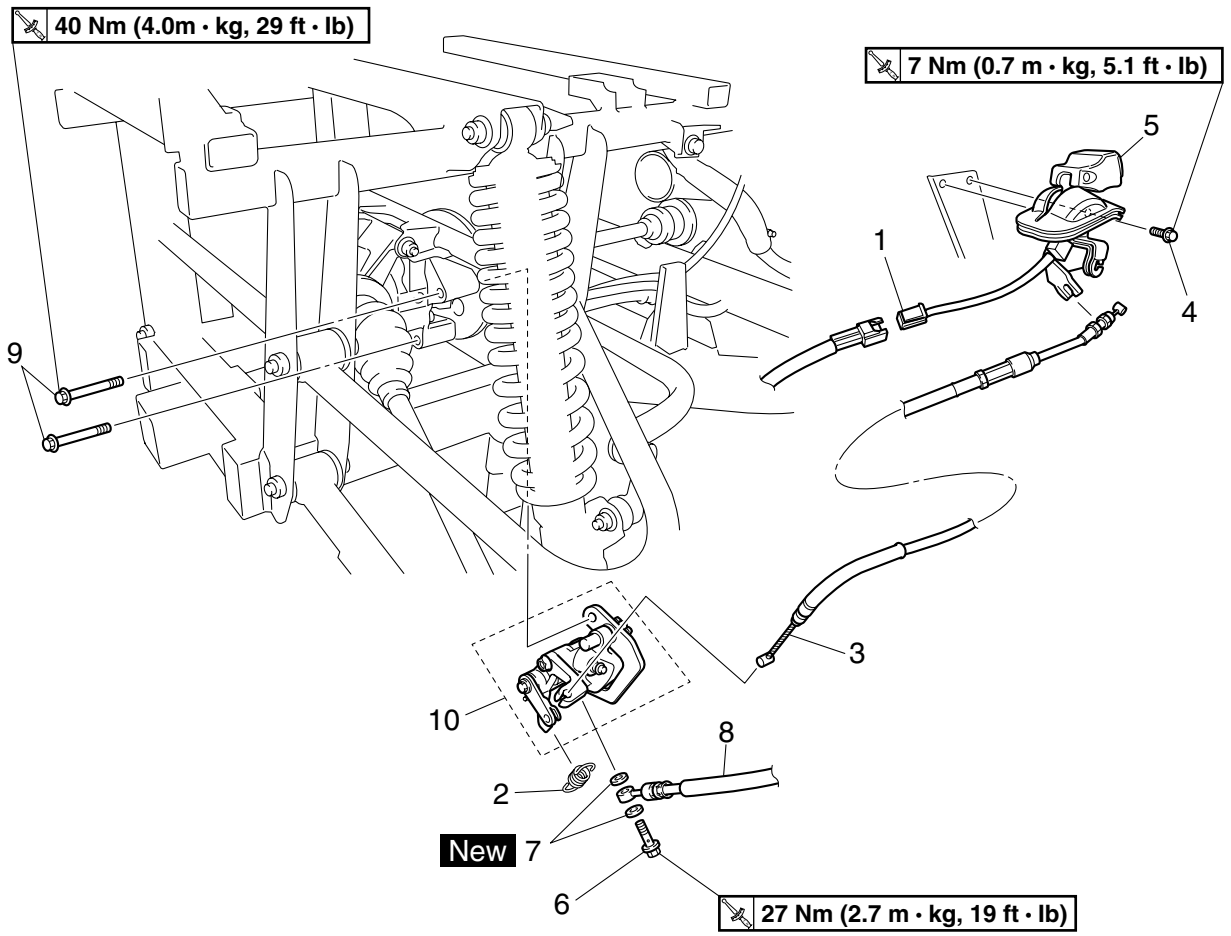


Order	Job/Part	Q'ty	Remarks
	Removing the front brake caliper		Remove the parts in the order listed.
	Brake fluid		Drain.
	Front wheel		Refer to "FRONT WHEELS AND BRAKE DISCS".
1	Union bolt	1	
2	Copper washer	2	
3	Brake hose	1	Disconnect.
4	Brake pad holding bolt	2	Loosen.
5	Brake caliper mounting bolt	2	Refer to "INSTALLING THE FRONT BRAKE CALIPERS".
6	Brake caliper assembly	1	
			For installation, reverse the removal procedure.

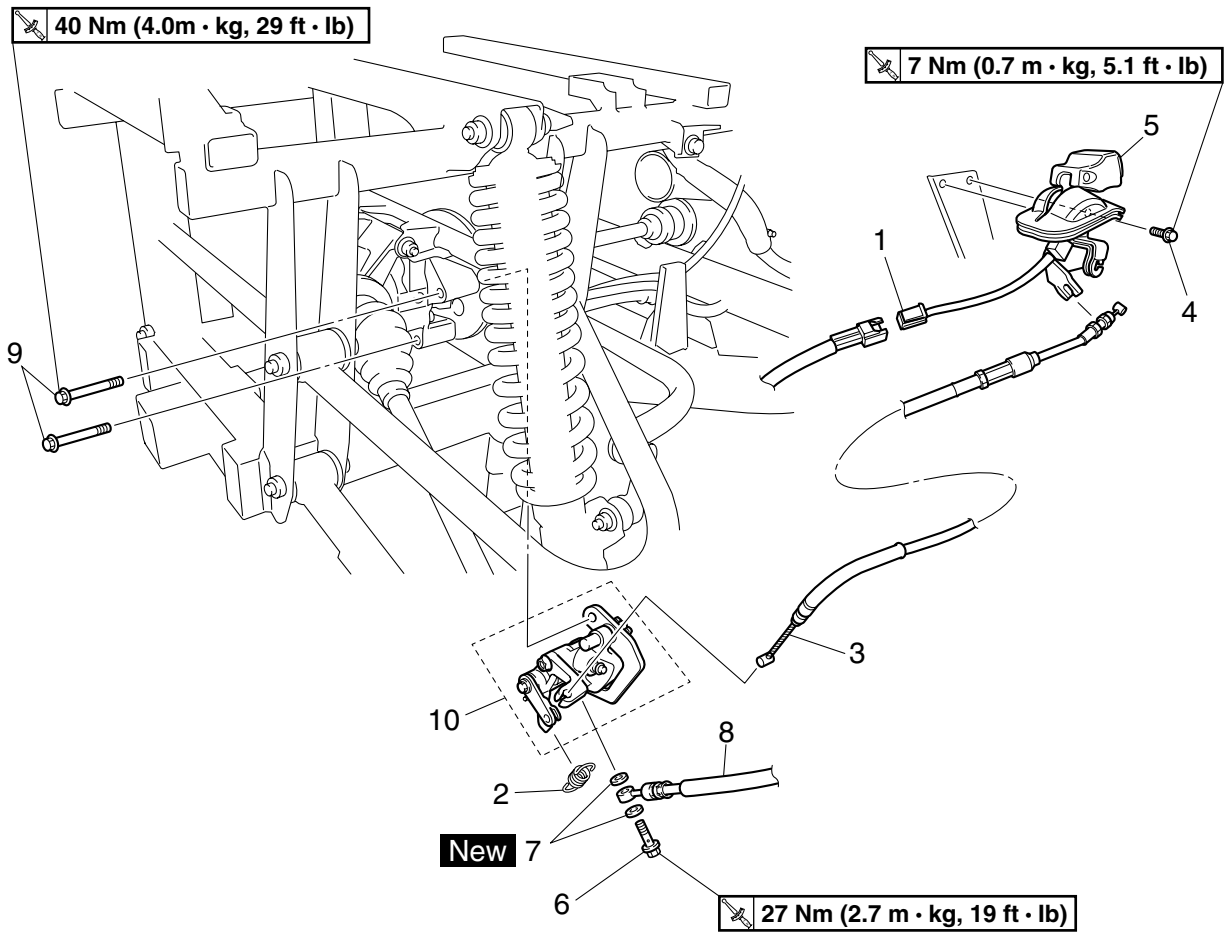


Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake caliper		Remove the parts in the order listed.
①	Brake pad holding bolt	2	
②	Brake pad	2	
③	Pad spring	1	
④	Caliper bracket	1	
⑤	Brake caliper piston	2	Refer to "DISASSEMBLING THE FRONT BRAKE CALIPERS" and "ASSEMBLING THE FRONT BRAKE CALIPERS".
⑥	Dust seal	2	
⑦	Caliper piston seal	2	
⑧	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

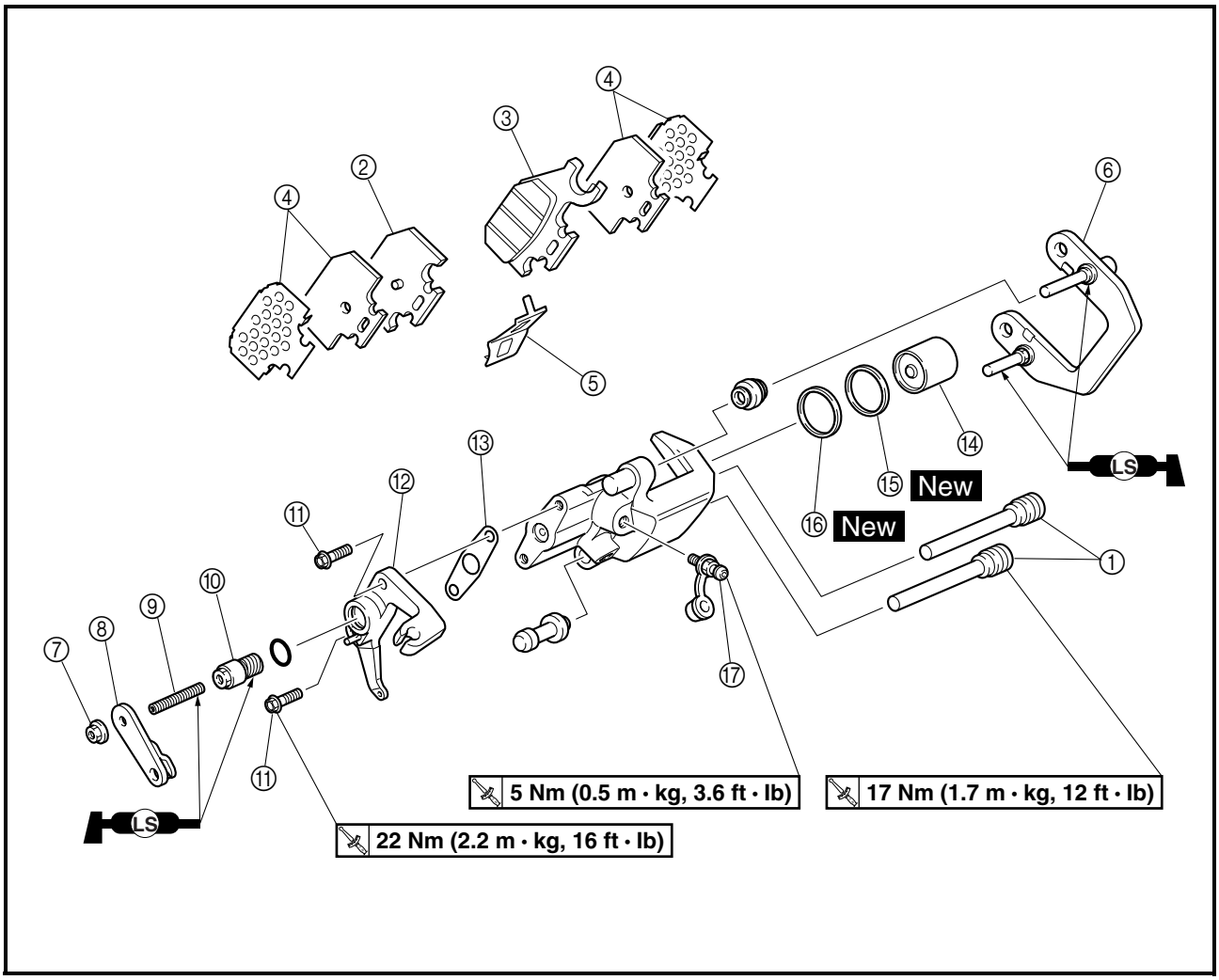
REAR BRAKE CALIPER



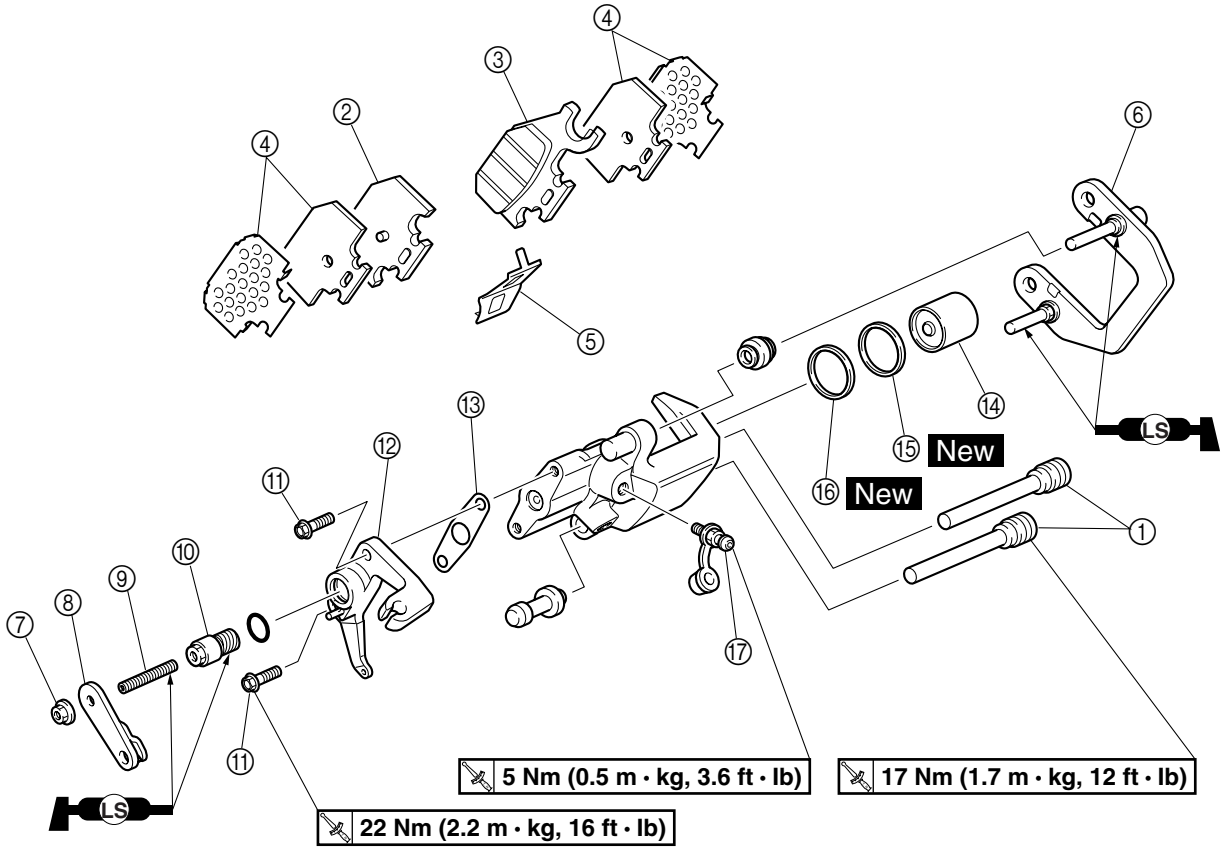
Order	Job/Part	Q'ty	Remarks
	Removing the rear brake caliper		Remove the parts in the order listed.
	Rear skid plate		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED".
	Brake fluid		Drain.
1	Parking brake switch coupler	1	Disconnect.
2	Spring	1	
3	Parking brake cable	1	
4	Parking brake lever assembly mounting bolt	1	
5	Parking brake lever assembly	1	



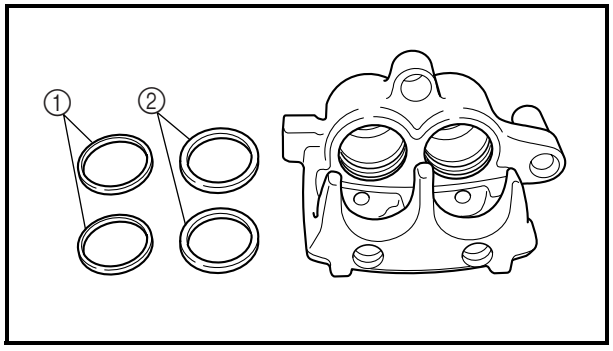
Order	Job/Part	Q'ty	Remarks
6	Union bolt	1	Disconnect. Refer to "INSTALLING THE REAR BRAKE CALIPER".
7	Copper washer	2	
8	Brake hose	1	
9	Brake caliper mounting bolt	2	
10	Brake caliper assembly	1	
			For installation, reverse the removal procedure.

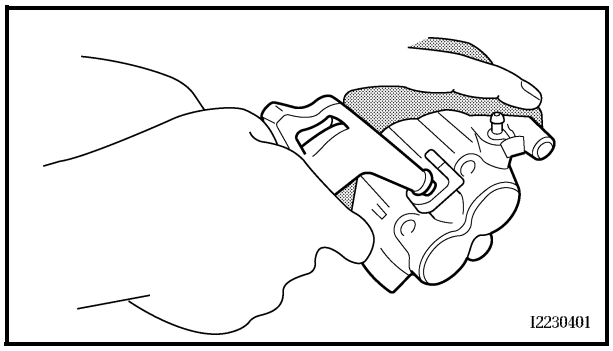


Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake caliper		Remove the parts in the order listed.
①	Brake pad holding bolt	1	Refer to "ASSEMBLING THE REAR BRAKE CALIPER".
②	Brake pad (piston side)	1	
③	Brake pad	1	
④	Insulator/pad shim	2/2	
⑤	Pad spring	1	
⑥	Brake caliper bracket	1	
⑦	Parking brake arm nut	1	Refer to "ASSEMBLING THE REAR BRAKE CALIPER".
⑧	Parking brake arm	1	
⑨	Set bolt	1	
⑩	Parking brake arm shaft	1	
⑪	Parking brake case bolt	2	



Order	Job/Part	Q'ty	Remarks
⑫	Parking brake case	1	Refer to "ASSEMBLING THE REAR BRAKE CALIPER".
⑬	Gasket	1	
⑭	Brake caliper piston	1	Refer to "DISASSEMBLING THE FRONT BRAKE CALIPERS" and "ASSEMBLING THE REAR BRAKE CALIPER".
⑮	Dust seal	1	
⑯	Caliper piston seal	1	
⑰	Bleed screw	1	
			For assembly, reverse the disassembly procedure.





EBS00427

DISASSEMBLING THE FRONT BRAKE CALIPERS

1. Remove:
   - brake caliper pistons
   - dust seals ①
   - caliper piston seals ②

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a. Blow compressed air into the hose joint opening to force out the caliper piston from the brake caliper body.

⚠ WARNING

- **Never try to pry out a caliper piston.**
- **Cover the caliper piston with a rag. Be careful not to get injured when the piston is expelled from the caliper cylinder.**

b. Remove the dust seals and caliper piston seals.

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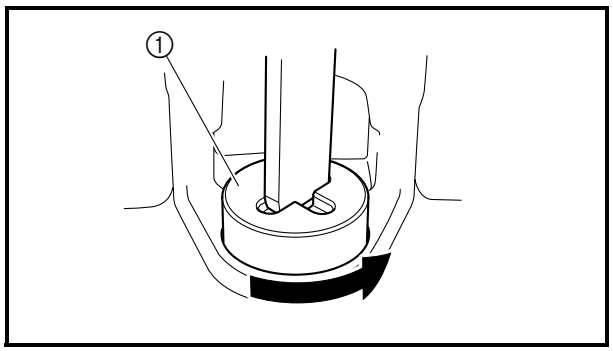

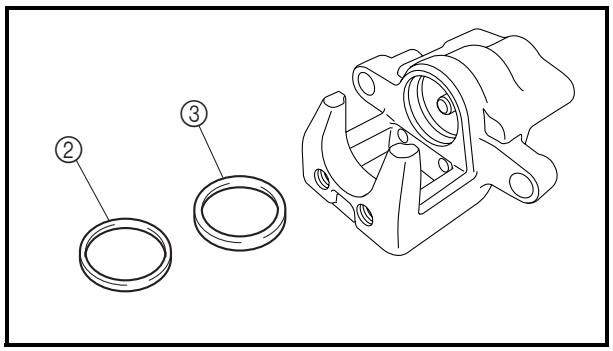

DISASSEMBLING THE REAR BRAKE CALIPER

1. Remove:
   - brake caliper piston ①
   - dust seal ②
   - caliper piston seal ③

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a. Turn the brake caliper piston counterclockwise to remove it.

⚠ WARNING

Never try to pry out the caliper piston.

b. Remove the dust seal and caliper piston seal.

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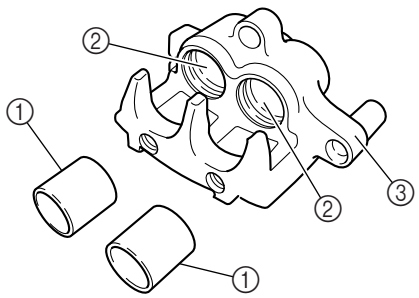
EB702040
CHECKING THE FRONT AND REAR BRAKE CALIPERS

Recommended brake component replacement schedule:	
Brake pads	**As required**
Piston seals, dust seals	**Every two years**
Brake hoses	**Every two years**
Brake fluid	**Replace when brakes are disassembled.**

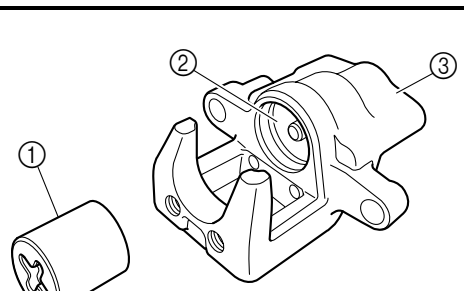
⚠ WARNING

All internal brake components should be cleaned in new brake fluid only. Do not use solvents as they will cause seals to swell and distort.

A



B



1. Check:
   - brake caliper pistons ①
     Scratches/rust/wear → Replace the brake caliper assembly.
   - brake caliper cylinders ②
     Wear/scratches → Replace the brake caliper assembly.
   - brake caliper body ③
     Cracks/damage → Replace.
   - brake fluid delivery passage (brake caliper body)
     Blockage → Blow out with compressed air.

⚠ WARNING

Replace the caliper piston seals and dust seals whenever the brake caliper is disassembled.

A Front
B Rear

EBS00431
ASSEMBLING THE FRONT BRAKE CALIPERS

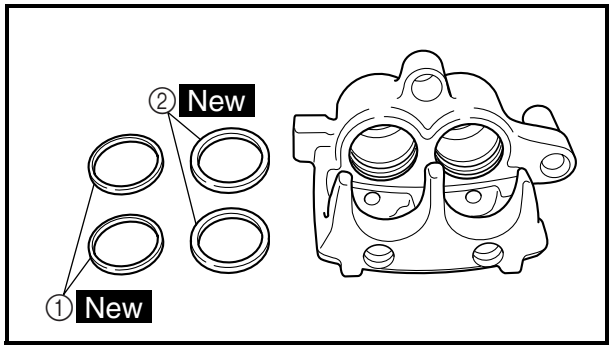
The following procedure applies to both of the front brake calipers.

⚠ WARNING

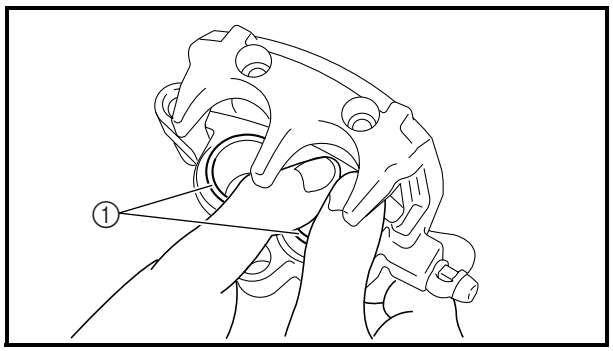
- **All internal brake components should be cleaned and lubricated with new brake fluid only before installation.**

Recommended brake fluid
DOT 4

- **Replace the caliper piston seals and dust seal whenever a brake caliper is disassembled.**



1. Install:
   - caliper piston seals ① New
   - dust seals ② New



2. Install:
   - brake caliper pistons ①

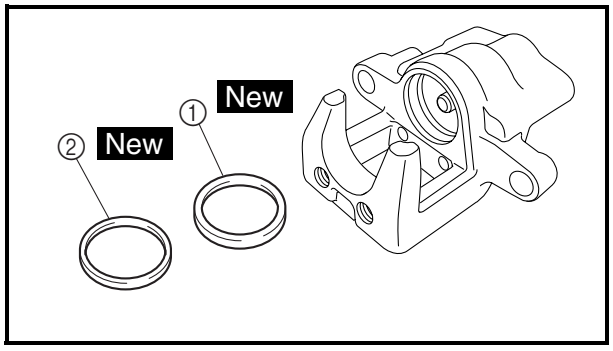
EBS00432
ASSEMBLING THE REAR BRAKE CALIPER

⚠ WARNING

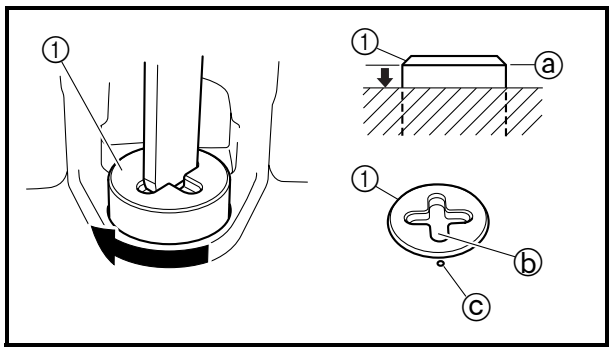
- **All internal brake components should be cleaned and lubricated with new brake fluid only before installation.**

Recommended brake fluid
DOT 4

- **Replace the caliper piston seal and dust seal whenever a brake caliper is disassembled.**

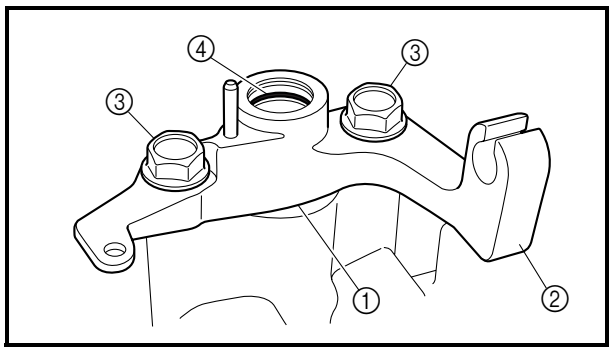


1. Install:
   - caliper piston seal ① New
   - dust seal ② New

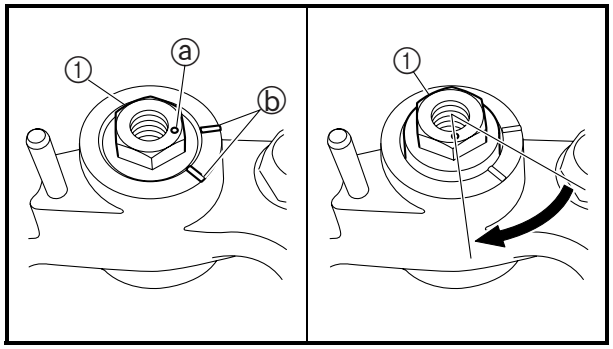


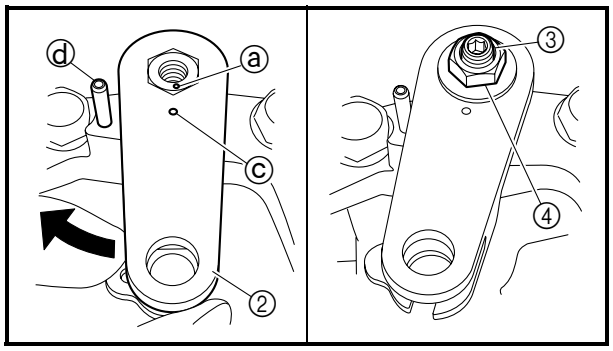
2. Install:
   - brake caliper piston ①
     Turn the brake caliper piston clockwise until section ⓐ of the brake caliper piston is level with the surface of the brake caliper body.

NOTE:
Align an end ⓑ of the groove in the brake caliper piston with the punch mark ⓒ on the brake caliper body.



3. Install:
   - gasket ①
   - parking brake case ②
   - parking brake case bolts ③
     22 Nm (2.2 m · kg, 16 ft · lb)
   - O-ring ④





4. Install:
   - parking brake arm shaft ①
   - parking brake arm ②
   - set bolt ③
   - parking brake arm nut ④

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NOTE:
Apply lithium-soap-based grease to the parking brake arm shaft and set bolt.

a. Screw in the parking brake arm shaft counterclockwise completely so that the punch mark ⓐ on the parking brake arm shaft is between the alignment marks ⓑ.

NOTE:
The hole for the parking brake arm shaft has multiple threads. If the punch mark ⓐ on the parking brake arm shaft is not between the alignment marks ⓑ when the parking brake arm shaft is screwed in completely, remove the parking brake arm shaft and screw it in from a different starting position.

b. Turn the parking brake arm shaft approximately 60° clockwise.
c. Install the parking brake arm to the parking brake arm shaft so that the punch mark ⓒ on the parking brake arm is aligned with the punch mark ⓐ on the parking brake arm shaft.
d. Turn the parking brake arm until it contacts the pin ⓓ.
e. Finger tighten the set bolt.
f. Tighten the parking brake arm nut.

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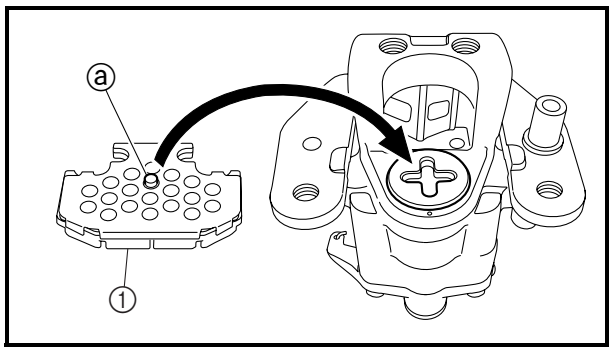
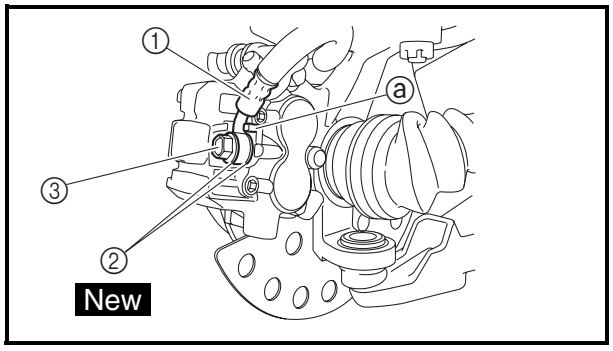


5. Install:
   - brake pad (piston side) ①
     (with insulator and pad shim)

NOTE:
Align the projection ⓐ on the piston side of the brake pad with the groove in the brake caliper piston.

6. Install:
   • brake pad holding bolts
   17 Nm (1.7 m · kg, 12 ft · lb)



EBS00434
INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the front brake calipers.

1. Install:
   • brake caliper assembly
   • brake caliper mounting bolts
   48 Nm (4.8 m · kg, 35 ft · lb)
   • brake hose ①
   • copper washers ② New
   • union bolt ③ **27 Nm (2.7 m · kg, 19 ft · lb)**

CAUTION:

When installing the brake hose on the brake caliper, make sure that the brake pipe touches the projection ⓐ on the brake caliper.

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" in chapter 2.

2. Fill:
   • brake reservoir

Recommended brake fluid
DOT 4

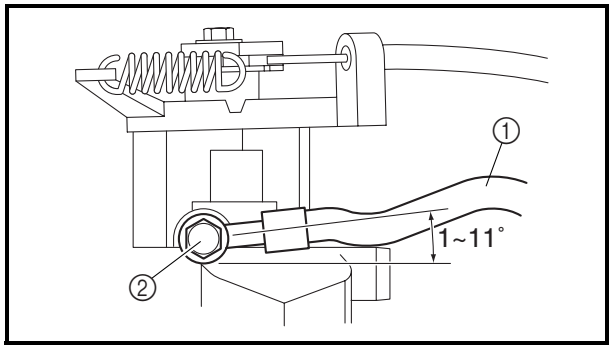
CAUTION:

Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

⚠ WARNING

- **Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.**
- **Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.**

3. Air bleed:
   - brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
4. Check:
   - brake fluid level
     Brake fluid level is below the "MIN" level line
     → Add the recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.



EBS00436
INSTALLING THE REAR BRAKE CALIPER

1. Install:
   - brake caliper assembly
   - brake caliper mounting bolts
     40 Nm (4.0 m · kg, 29 ft · lb)
   - brake hose ①
   - copper washers New
   - union bolt ② **27 Nm (2.7 m · kg, 19 ft · lb)**

NOTE:
Tighten the union bolt while holding the brake hose as shown.

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" in chapter 2.

2. Fill:
   • brake reservoir

Recommended brake fluid
DOT 4

CAUTION:

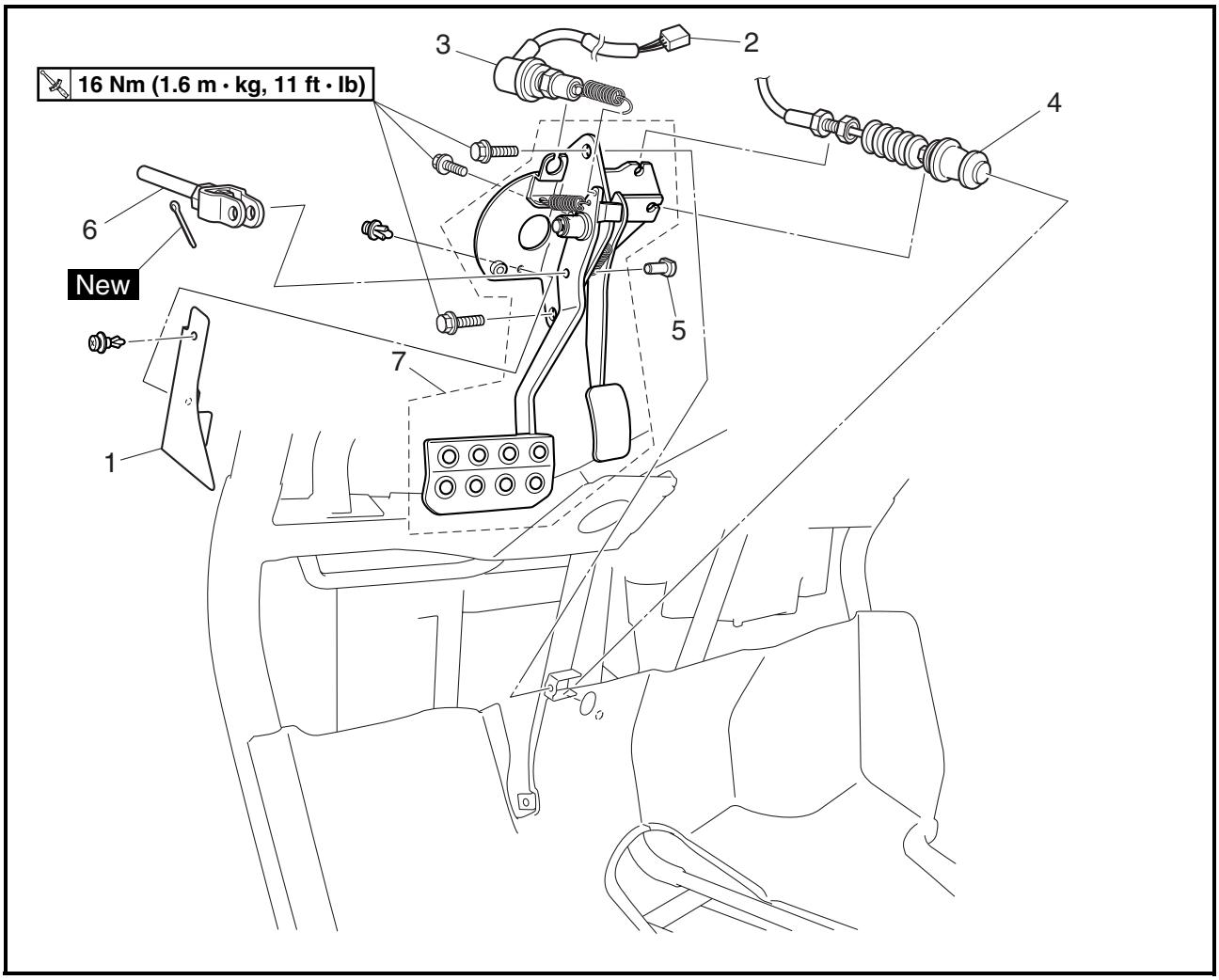
Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

⚠ WARNING

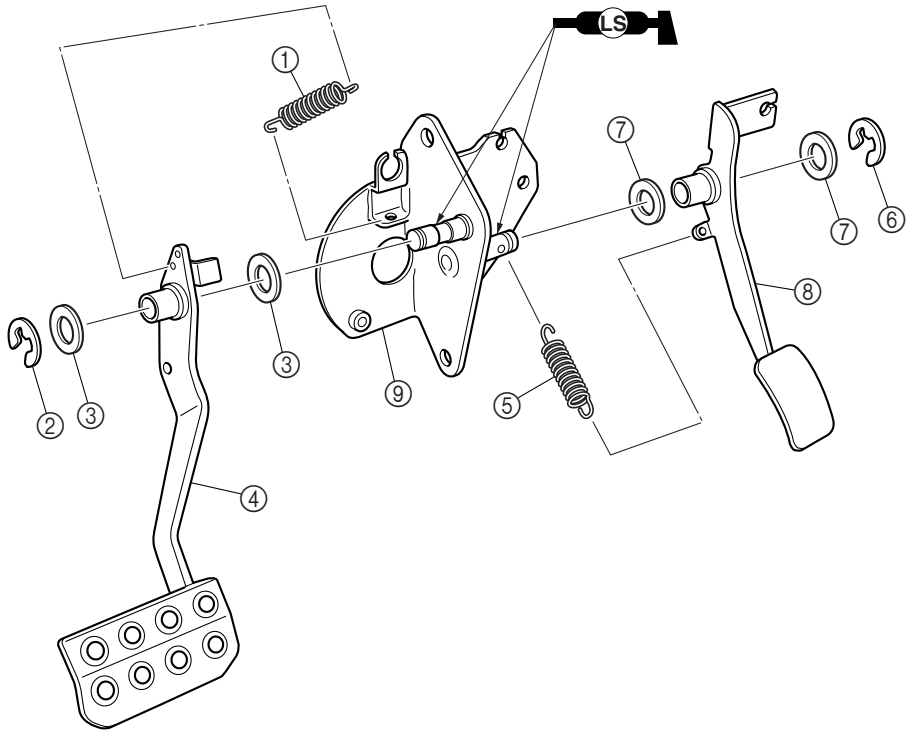
- **Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.**
- **Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.**

3. Air bleed:
   • brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
4. Check:
   • brake fluid level
   Brake fluid level is below the "MIN" level line
   → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.
5. Adjust:
   • parking brake cable free play
   Refer to "ADJUSTING THE PARKING BRAKE" in chapter 3.

PEDAL ASSEMBLY



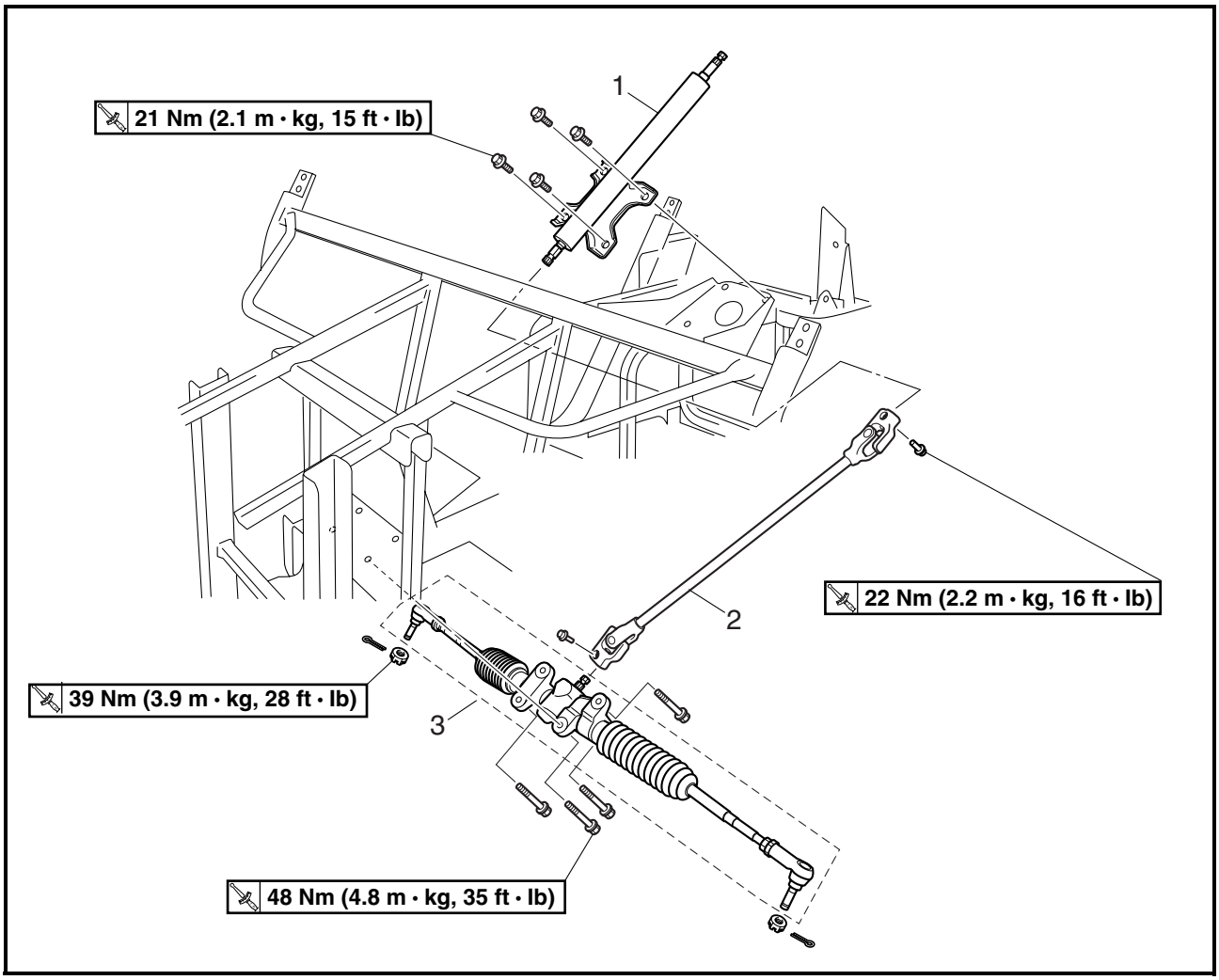
Order	Job/Part	Q'ty	Remarks
	Removing the pedal assembly		Remove the parts in the order listed.
	Steering wheel cover/steering wheel/ pedal cover/upper instrument panel/ lower instrument panel		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED".
	Steering joint		Refer to "STEERING SYSTEM".
	Brake master cylinder		Refer to "FRONT AND REAR BRAKES".
1	Splash plate	1	
2	Brake light switch coupler	1	Disconnect.
3	Brake switch	1	
4	Throttle cable	1	Disconnect.
5	Pin	1	
6	Brake pedal rod	1	
7	Pedal assembly	1	
			For installation, reverse the removal procedure.



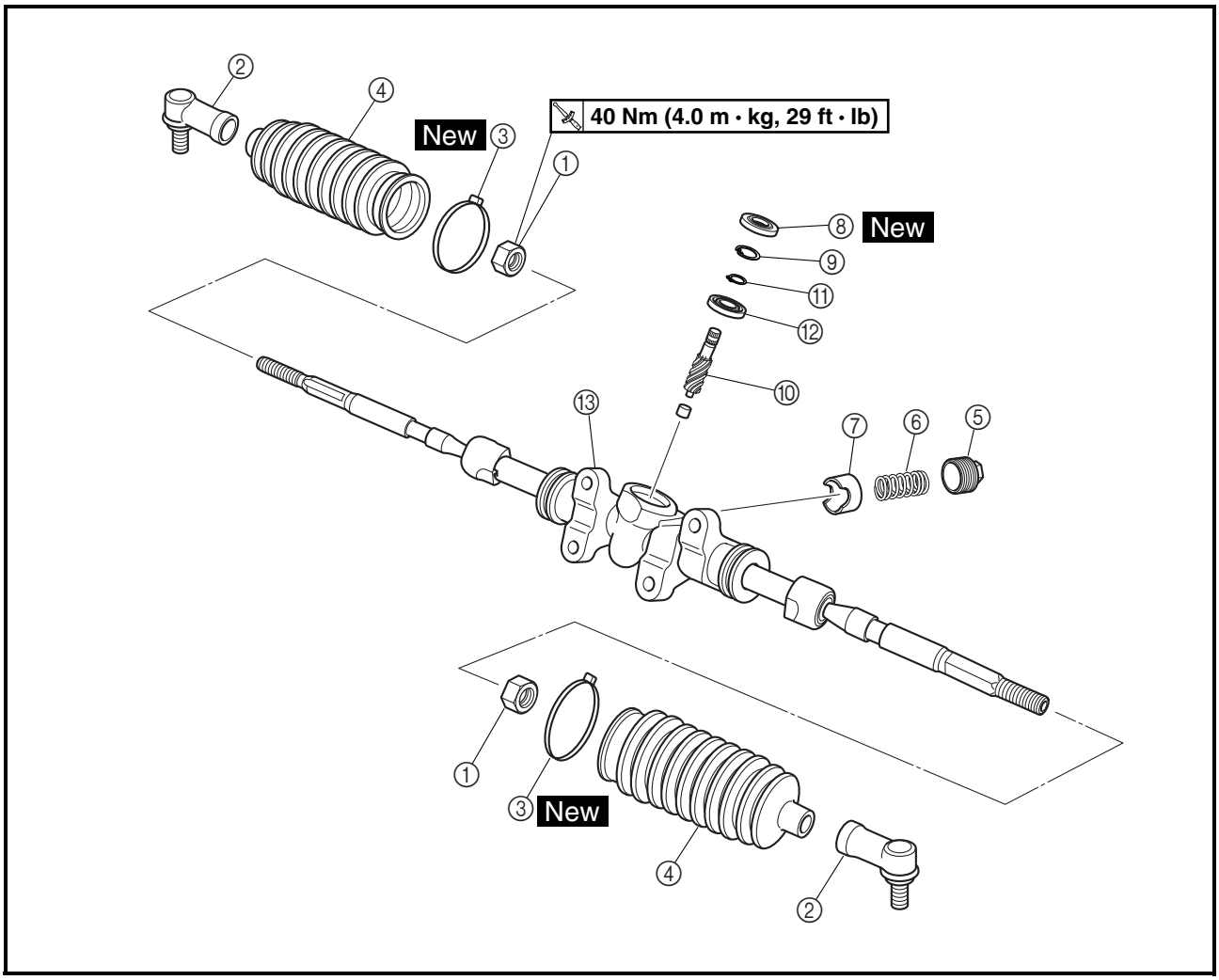
Order	Job/Part	Q'ty	Remarks
	Disassembling the pedal assembly		Remove the parts in the order listed.
①	Spring	1	
②	Circlip	1	
③	Washer	2	
④	Brake pedal	1	
⑤	Spring	1	
⑥	Circlip	1	
⑦	Washer	2	
⑧	Accelerator pedal	1	
⑨	Pedal assembly bracket	1	
			For assembly, reverse the disassembly procedure.

STEERING SYSTEM

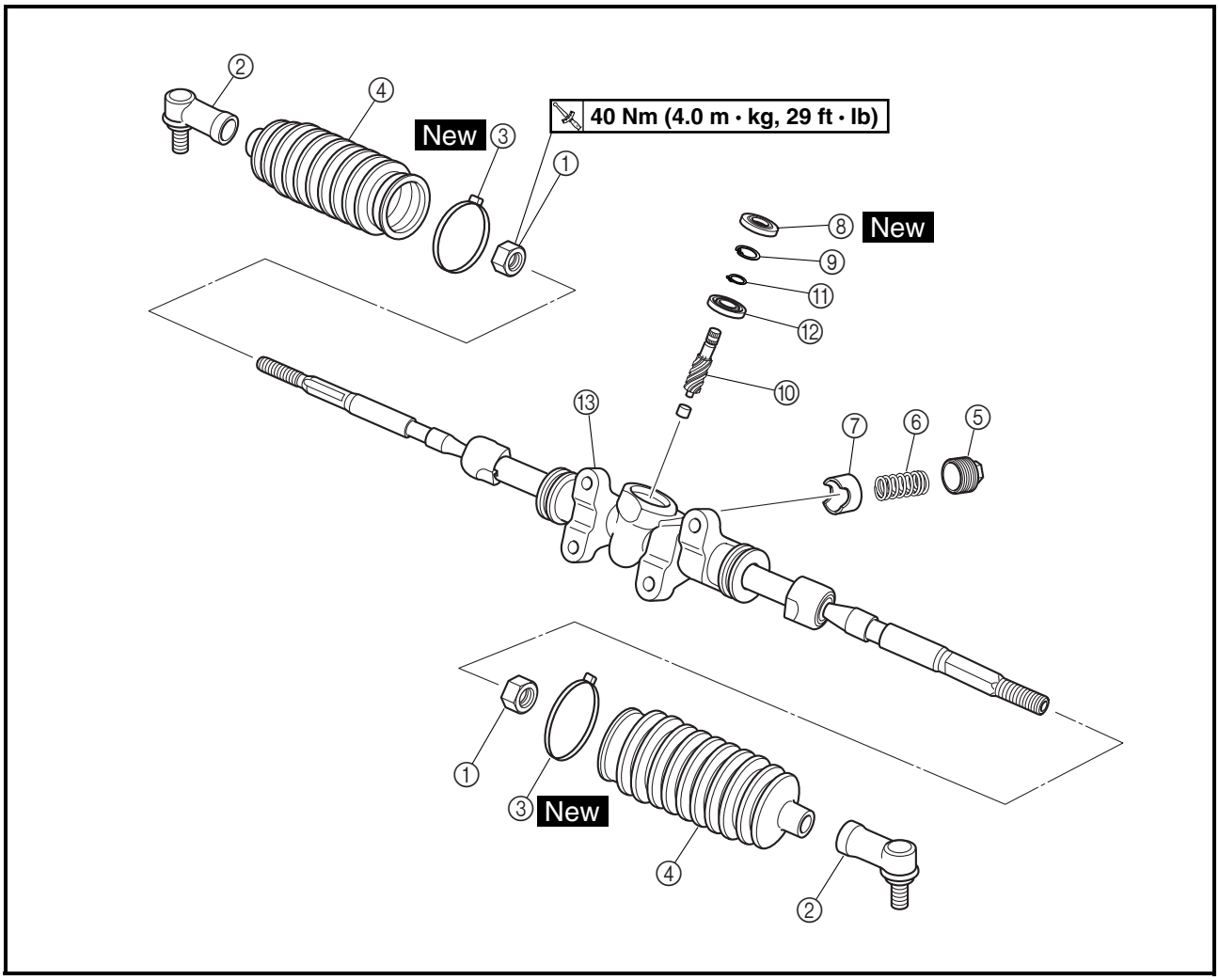
STEERING COLUMN AND STEERING ASSEMBLY



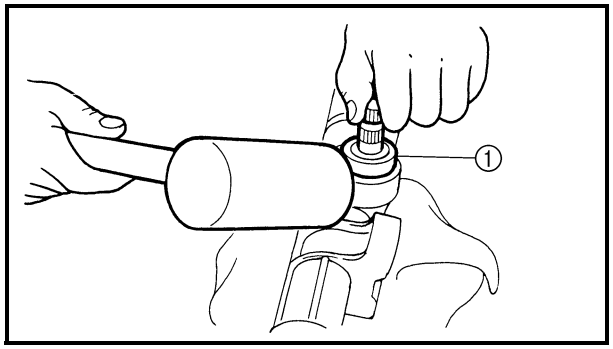
Order	Job/Part	Q'ty	Remarks
	Removing the steering column and steering assembly		Remove the parts in the order listed.
	Steering wheel cover/steering wheel/ upper instrument panel/lower instrument panel		Refer to "SEATS, ENCLOSURE, HOOD AND CARGO BED".
1	Steering shaft	1	
2	Steering joint	1	
3	Steering assembly	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the steering assembly		Remove the parts in the order listed.
①	Tie-rod end locknut	2	
②	Tie-rod end	2	
③	Plastic locking tie	2	
④	Dust boot	2	
⑤	Adjuster	1	Refer to "ASSEMBLING THE STEERING ASSEMBLY".
⑥	Spring	1	
⑦	Pressure pad	1	
⑧	Oil seal	1	
⑨	Circlip	1	
⑩	Pinion gear	1	Refer to "DISASSEMBLING THE STEERING ASSEMBLY" and "ASSEMBLING THE STEERING ASSEMBLY".
⑪	Circlip	1	
⑫	Bearing	1	



Order	Job/Part	Q'ty	Remarks
⑬	Steering assembly	1	Refer to "ASSEMBLING THE STEERING ASSEMBLY". For assembly, reverse the disassembly procedure.

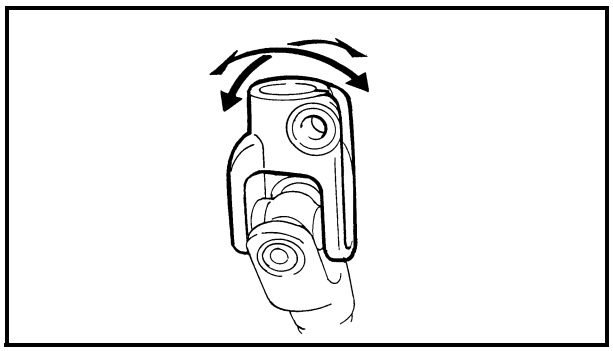


DISASSEMBLING THE STEERING ASSEMBLY

1. Remove:
   - oil seal
   - circlip
   - pinion gear with bearing ①

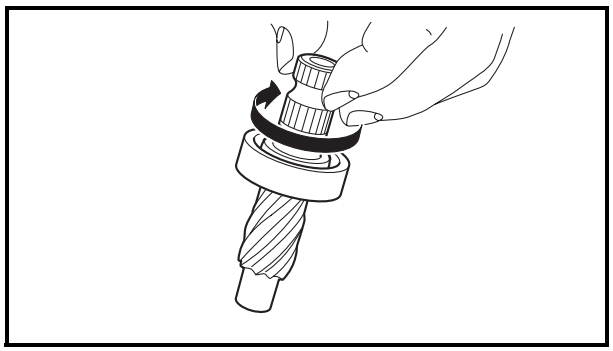
NOTE:

Lightly tap on the steering housing with a soft hammer to remove the pinion gear easily.



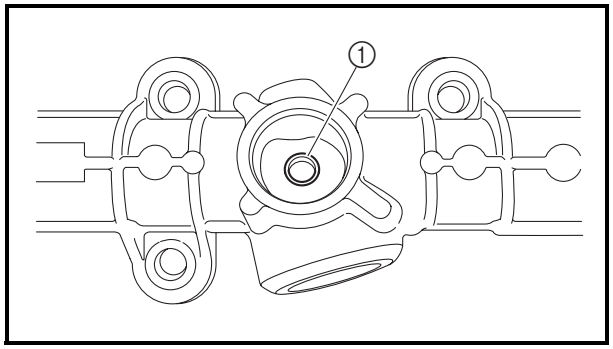
CHECKING THE STEERING JOINT

1. Check:
   - steering joint
     Rough movement → Replace.



CHECKING THE STEERING ASSEMBLY

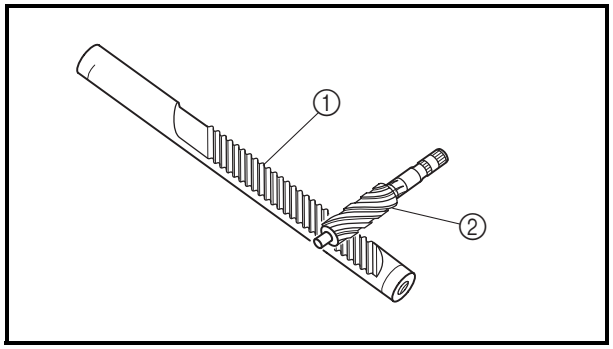
1. Check:
   - pinion gear bearing
     Check the bearing movement on the pinion gear by rotating with the fingers.
     Roughness → Replace.



2. Check:
   - pinion needle bearing ①
     Damage → Replace.

NOTE:

When replacing the pinion needle bearing, it is recommended to replace the steering assembly. The steering housing may be subject to damage during removal of the pinion needle bearing.

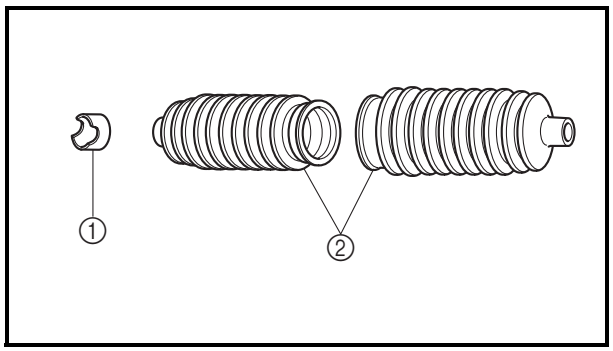


3. Check:
   - rack gear teeth ①
   - pinion gear teeth ②

   Wear/damage → Replace the steering assembly.

NOTE:

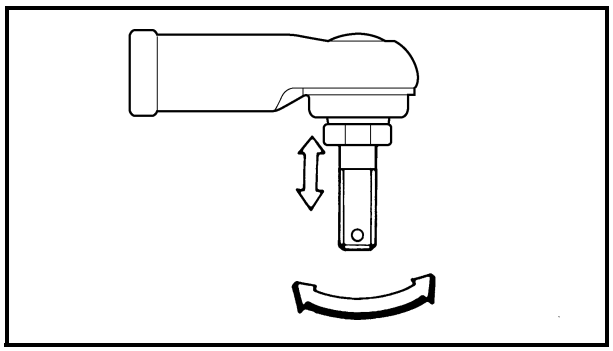
The wear pattern on the rack and pinion gear teeth should be uniform. An uneven wear pattern may indicate improper adjustment or lack of lubrication.



4. Check:
   - pressure pad ①

     Wear/damage → Replace.
   - dust boots ②

     Damage → Replace.



5. Check:
   - tie-rod free play and movement

     Free play → Replace the tie-rod end.

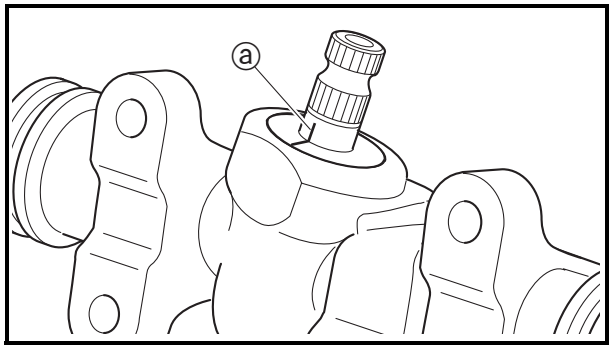
     Turns roughly → Replace the tie-rod end.
6. Check:
   - tie-rods

     Bends/damage → Replace.

ASSEMBLING THE STEERING ASSEMBLY

1. Lubricate:
   - bearings
   - rack gear
   - pinion gear
   - oil seal

	Recommended lubricant **Molybdenum disulfide grease**



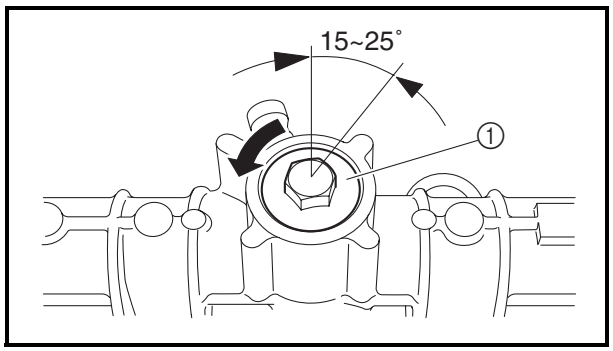
2. Install:
   - steering assembly
   - bearing
   - circlips
   - pinion gear
   - oil seal New

NOTE:

After centering the rack gear, make two alignment marks ⓐ on the pinion gear and the steering housing to mark the position of the pinion gear. This is necessary to install the steering joint to the pinion gear properly.

3. Apply lithium-soap-based grease to the gear surface of the rack gear.

	Lithium-soap-based grease **5 ~ 10 g (0.2 ~ 0.4 oz)**



4. Adjust:
   - rack gear-pinion gear backlash

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a. Install the force pressure pad, spring, and adjuster.
b. Tighten the adjuster ①.

	Adjuster **3.9 Nm (0.39 m · kg, 2.8 ft · lb)** **LOCTITE®**

c. Loosen the adjuster 15 ~ 25°.

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5. Install:
   - dust boots
   - plastic locking tie New
   - tie-rod end
   - tie-rod end locknut

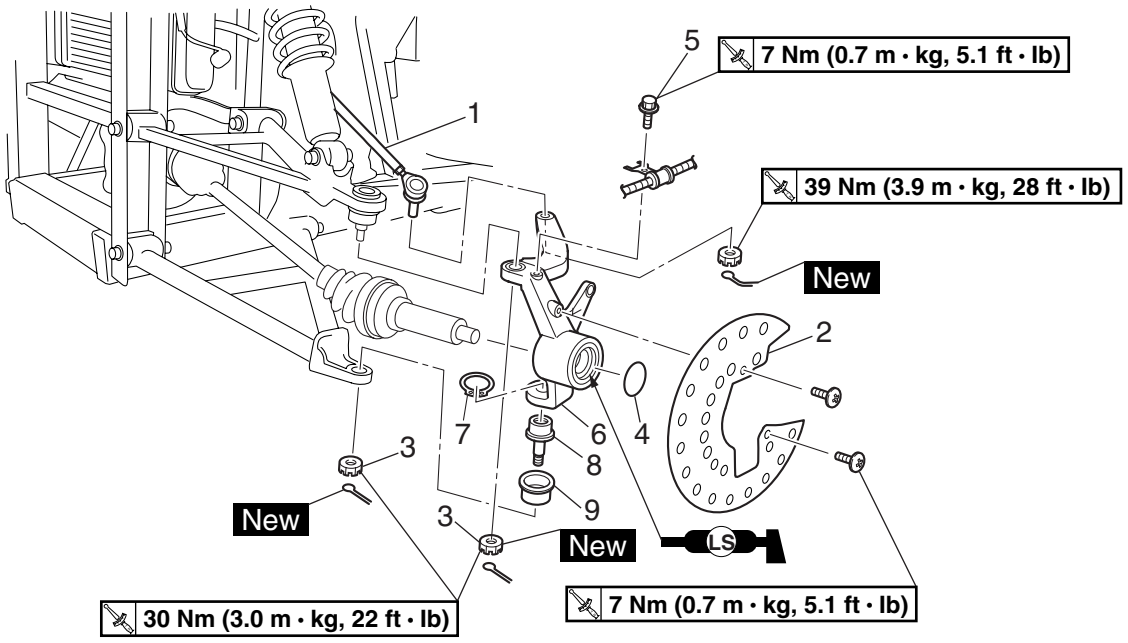
40 Nm (4.0 m · kg, 29 ft · lb)

INSTALLING THE STEERING SYSTEM

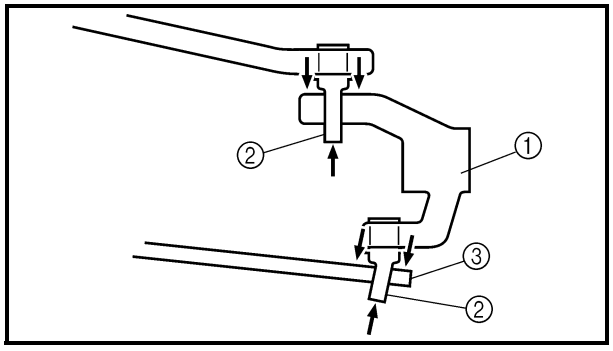
1. Adjust:
   - toe-in

   Refer to “ADJUSTING THE TOE-IN” in chapter 3.

TIE-ROD AND STEERING KNUCKLE



Order	Job/Part	Q'ty	Remarks
	Removing the tie-rod and steering knuckle		Remove the parts in the order listed.
	Front wheel/brake disc		Refer to "FRONT WHEELS AND BRAKE DISCS".
1	Tie-rod	1	
2	Brake disc guard	1	
3	Nut	2	
4	O-ring	1	
5	Brake hose holder bolt	1	
6	Steering knuckle	1	Refer to "REMOVING THE STEERING KNUCKLES".
7	Circlip	1	
8	Rubber boot	1	
9	Ball joint	1	
			For installation, reverse the removal procedure.

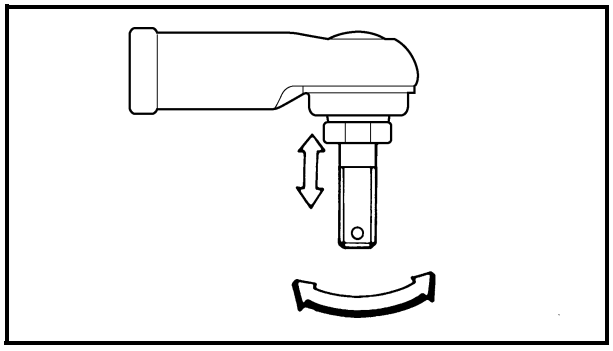


REMOVING THE STEERING KNUCKLES

1. Remove:
   • steering knuckle ①

NOTE:

Use a general puller to separate the ball joints ② from the steering knuckle ① or the front lower arm ③.

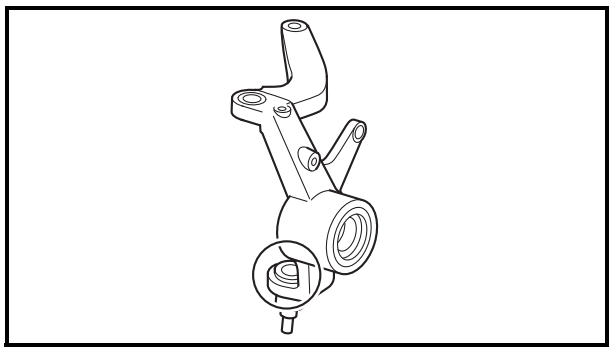


CHECKING THE TIE-RODS

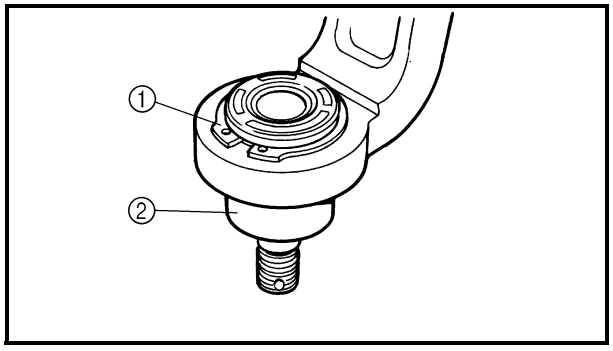
1. Check:
   • tie-rod free play and movement
   Free play → Replace the tie-rod end.
   Turns roughly → Replace the tie-rod end.
2. Check:
   • tie-rods
   Bends/damage → Replace.

CHECKING THE STEERING KNUCKLES

1. Check:
   • steering knuckles
   Damage/pitting → Replace.



2. Check:
   • ball joints
   Damage/pitting → Replace the ball joint.
   Free play → Replace the ball joint.
   Turns roughly → Replace the ball joint.



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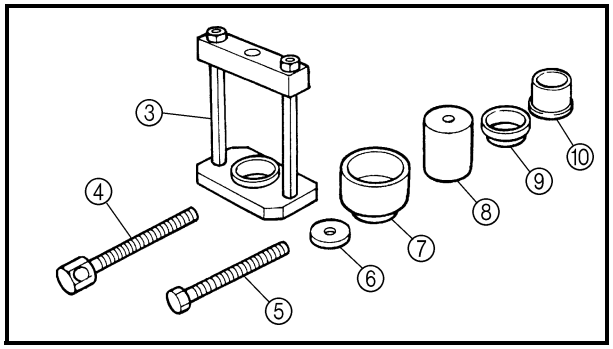
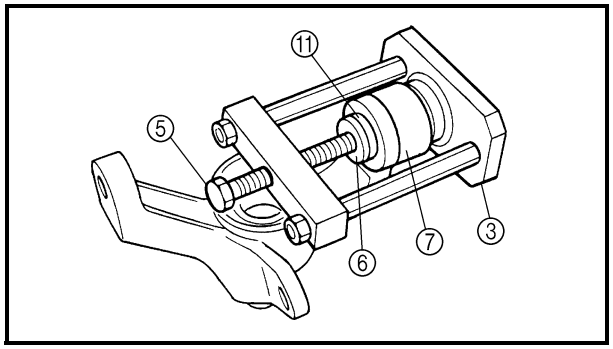
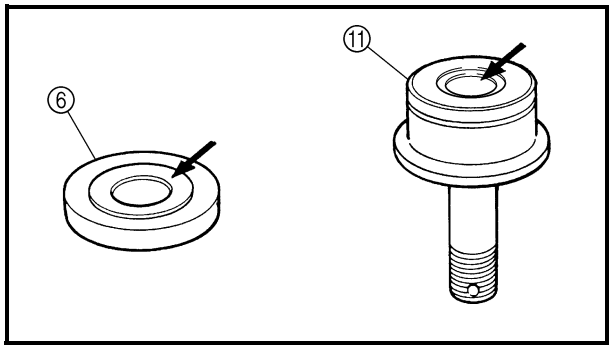
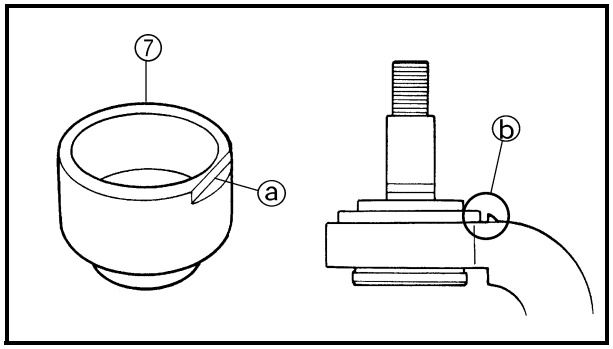
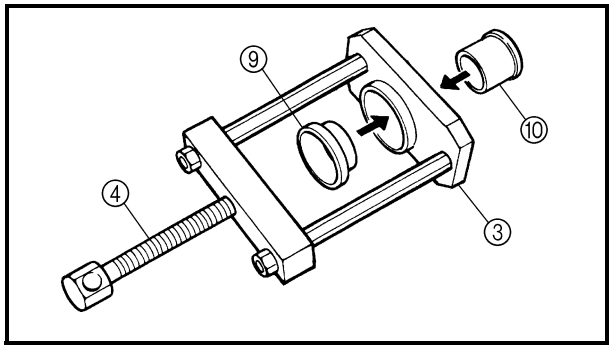
a. Clean the outside of the steering knuckle.
b. Remove the steering knuckle oil seal.
c. Remove the circlip ① and rubber boot ②.
   Use the ball joint remover and installer set.











Ball joint remover/installer set
P/N. 90890-01474
Ball joint adapter set
P/N. YM-01474
Ball joint remover/installer attachment set
P/N. YM-01477

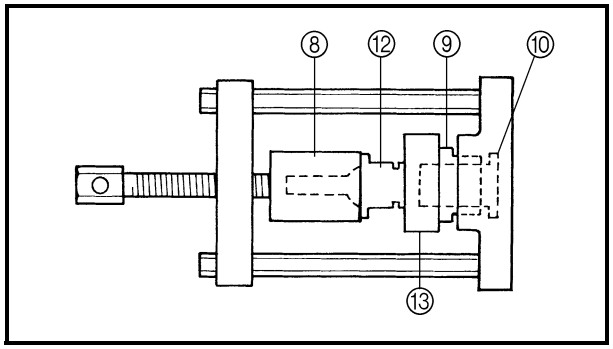
③	**Body**	**YM-01474** **90890-01474**
④	**Long bolt**	**YM-01474** **90890-01474**
⑤	**Short bolt**	**YM-01477**
⑥	**Remover washer**	**YM-01477**
⑦	**Remover spacer**	**YM-01477**
⑧	**Installer attachment**	**YM-01477**
⑨	**Installer spacer**	**YM-01477**
⑩	**Installer guide**	**YM-01477**

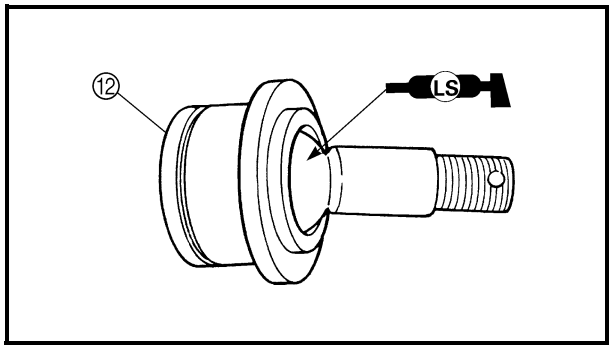
d. Install the body ③, short bolt ⑤, remover washer ⑥ and remover spacer ⑦ onto the ball joint.

NOTE:
- Remover washer ⑥ must be aligned with the projection on the head of the ball joint.
- Surface ⓐ of the remover spacer ⑦ must be aligned with the surface ⓑ of the steering knuckle.

e. Hold the body ③ in place while turning in the short bolt ⑤ to remove the ball joint ⑪ from the steering knuckle.
f. Remove the ball joint remover/installer.

g. Install the long bolt ④, installer spacer ⑨ and installer guide ⑩ onto the body ③.





h. Attach the assembled ball joint remover/installer, new ball joint ⑫ and installer attachment ⑧ to the steering knuckle ⑬.

NOTE:
Do not tap or damage the top of the ball joint.

i. Hold the body ③ in place while turning in the long bolt ④ to install the new ball joint ⑫ into the steering knuckle ⑬.
j. Remove the ball joint remover/installer.
k. Apply lithium-soap base grease to the new ball joint ⑫.
l. Install a new rubber boot and new circlip.

NOTE:
Always use a new ball joint set.

m. Install a steering knuckle oil seal.

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3. Check:
   - front wheel bearings
     Bearings allow play in the wheel hubs or the wheel turns roughly → Replace.
   - oil seals
     Damage → Replace.

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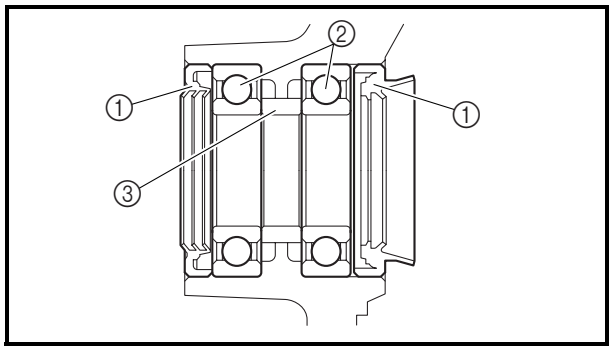
a. Clean the outside of the steering knuckle.
b. Remove the oil seals ①.
c. Drive out the bearings ②.



⚠ WARNING
Eye protection is recommended when using striking tools.

d. Remove the spacer ③.
e. Apply lithium base grease to the bearings and oil seals.
f. Install the spacer to the steering knuckle.
g. Install the new bearings.

NOTE:
Install the outside bearing first.

CAUTION:
Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

h. Install the new oil seals.

NOTE:

When installing the oil seals, the “seal side” of the oil seal faces out.

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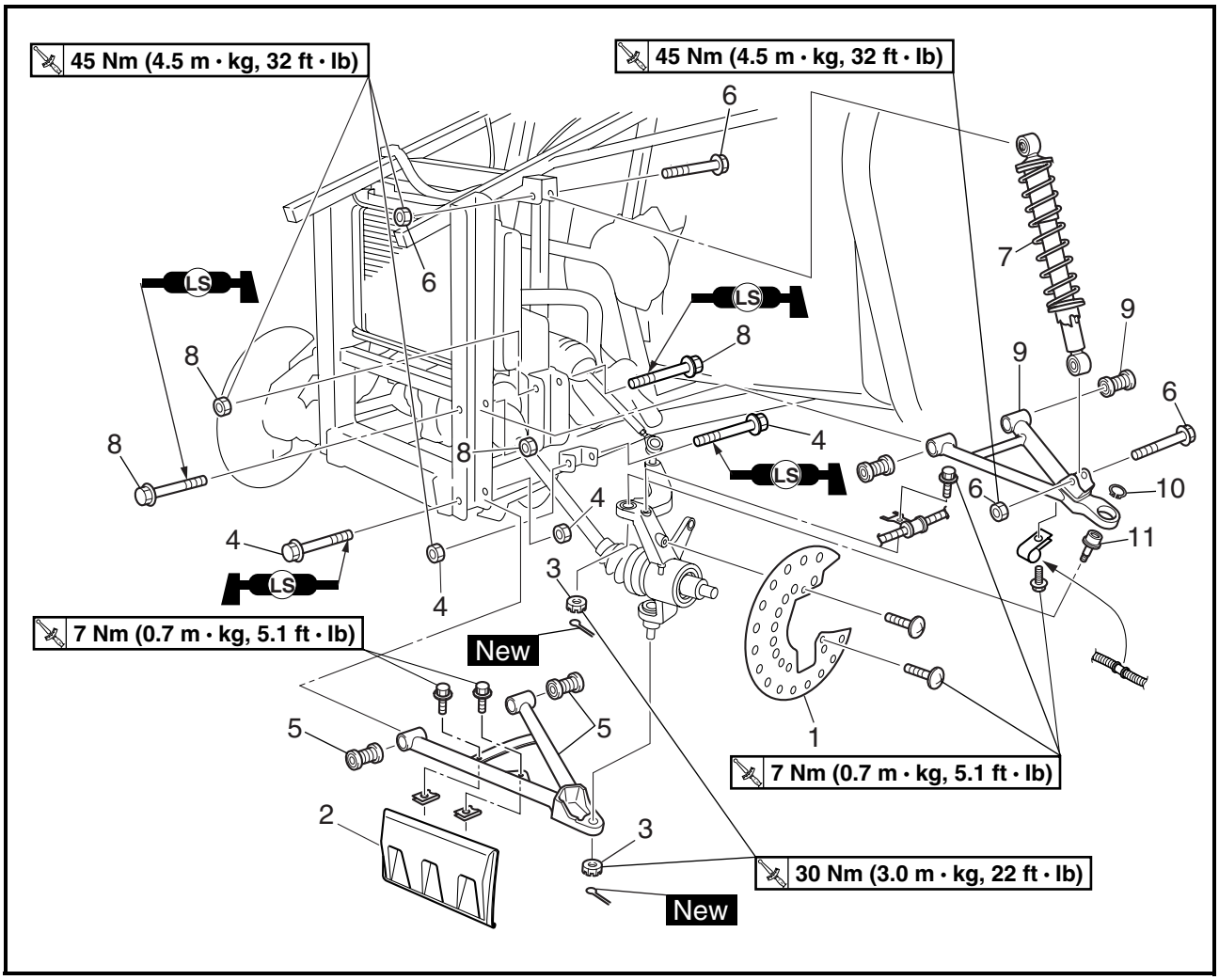
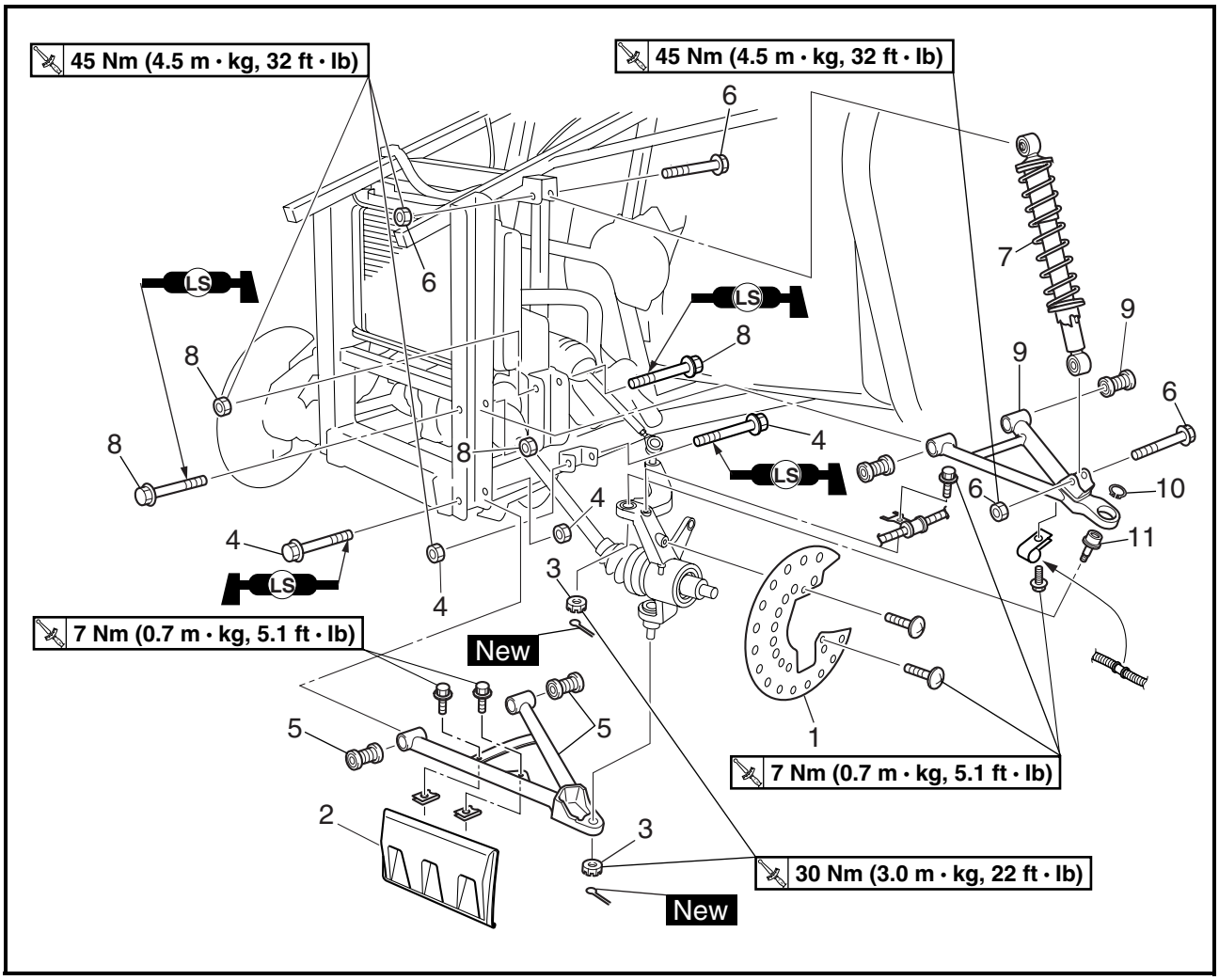
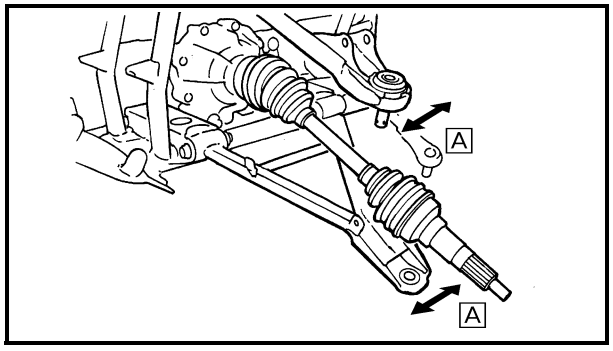
FRONT ARMS AND FRONT SHOCK ABSORBER

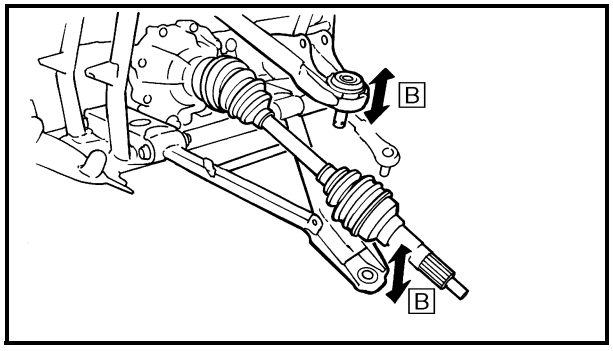


Order	Job/Part	Q'ty	Remarks
	Removing the front arms and front shock absorber		Remove the parts in the order listed.
	Front wheel/brake disc		Refer to "FRONT WHEELS AND BRAKE DISCS".
1	Brake disc guard	1	
2	Front arm protector	1	
3	Nut	2	Refer to "REMOVING THE FRONT ARMS" and "INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER".
4	Bolt/nut	2/2	
5	Front lower arm/bushing	1/2	
6	Nut/bolt	2/2	
7	Front shock absorber	1	
8	Bolt/nut	2/2	
9	Front upper arm/bushing	1/2	



Order	Job/Part	Q'ty	Remarks
10	Circlip	1	
11	Ball joint	1	
			For installation, reverse the removal procedure.





REMOVING THE FRONT ARMS

1. Check:
   - front arm free play

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a. Check the front arm side play [A] by moving it from side to side.
   If side play is noticeable, check the bushings.
b. Check the front arm vertical movement [B] by moving it up and down.
   If the vertical movement is tight or rough, or if there is binding, check the bushings.

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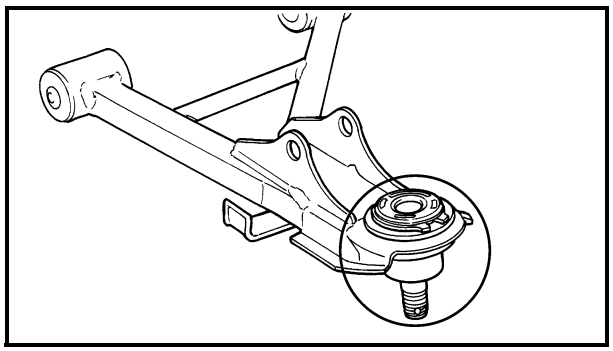
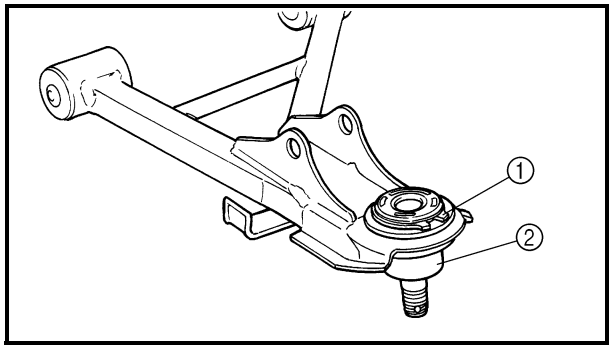
2. Remove:
   - front arms

CHECKING THE FRONT ARMS

1. Check:
   - front arms
     Bends/damage → Replace.
2. Check:
   - bushings
     Wear/damage → Replace.



3. Check:
   - ball joint
     Damage/pitting → Replace the ball joint.
     Free play → Replace the ball joint.
     Turns roughly → Replace the ball joint.



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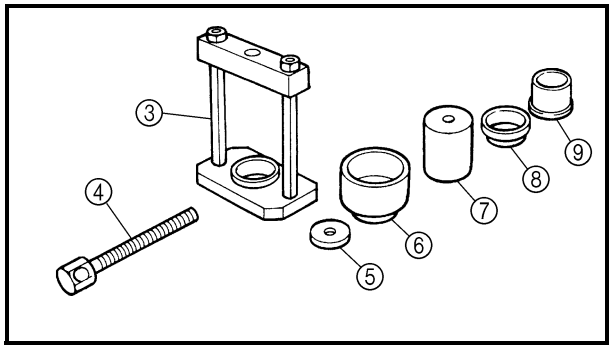
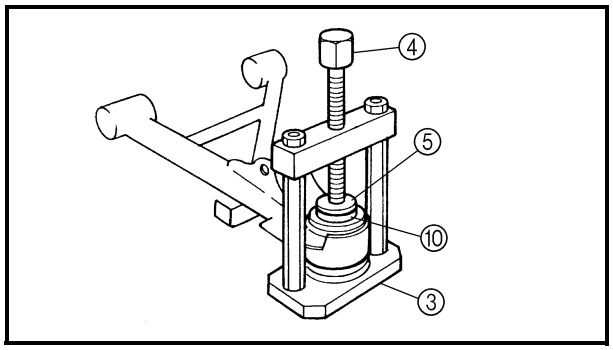
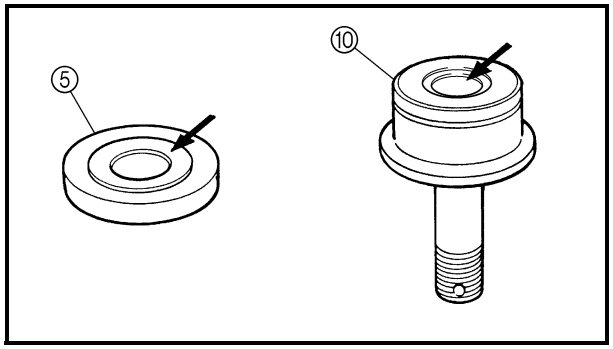
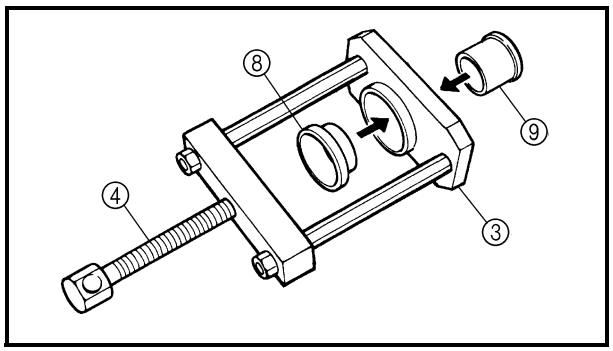
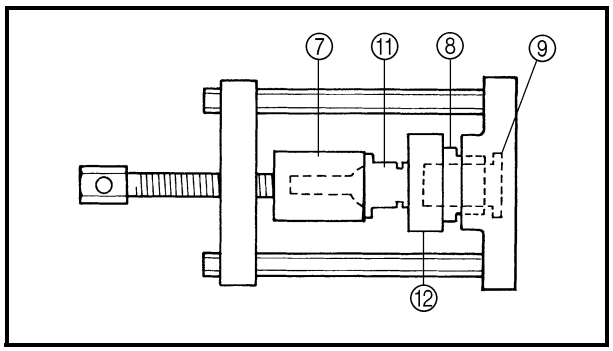
a. Clean the outside of the front lower arm.
b. Remove the circlip ① and rubber boot ②.
   Use the ball joint remover and installer set.











Ball joint remover/installer set
P/N. 90890-01474
Ball joint adapter set
P/N. YM-01474
Ball joint remover/installer attachment set
P/N. YM-01477

③	**Body**	**YM-01474** **90890-01474**
④	**Long bolt**	**YM-01474** **90890-01474**
⑤	**Remover washer**	**YM-01477**
⑥	**Remover spacer**	**YM-01477**
⑦	**Installer attachment**	**YM-01477**
⑧	**Installer spacer**	**YM-01477**
⑨	**Installer guide**	**YM-01477**

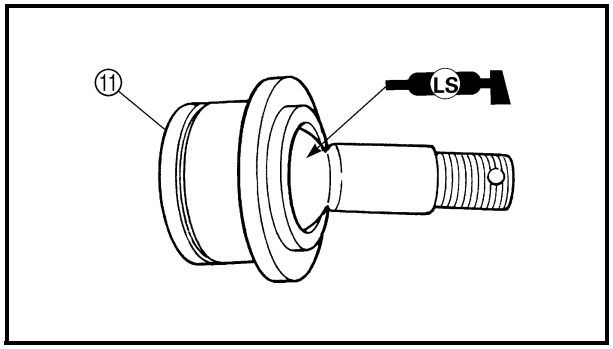
c. Install the body ③, long bolt ④, remover washer ⑤ and remover spacer ⑥ onto ball joint.

NOTE:
Remover washer ⑤ must be aligned with the projection on the head of the ball joint.

d. Hold the body ③ in place while turning in the long bolt ④ to remove the ball joint ⑩ from the front lower arm.
e. Remove the ball joint remover/installer.
f. Install the long bolt ④, installer spacer ⑧ and installer guide ⑨ onto the body ③.
g. Attach the assembled ball joint remover/installer, new ball joint ⑪ and installer attachment ⑦ to the front lower arm ⑫.

NOTE:
Do not tap or damage the top of the ball joint.

h. Hold the body ③ in place while turning in the long bolt ④ to install the new ball joint ⑪ into the front lower arm ⑫.
i. Remove the ball joint remover/installer.



j. Apply lithium-soap base grease to the new ball joint ⑪.
k. Install a new rubber boot and new circlip.

NOTE:
Always use a new ball joint set.

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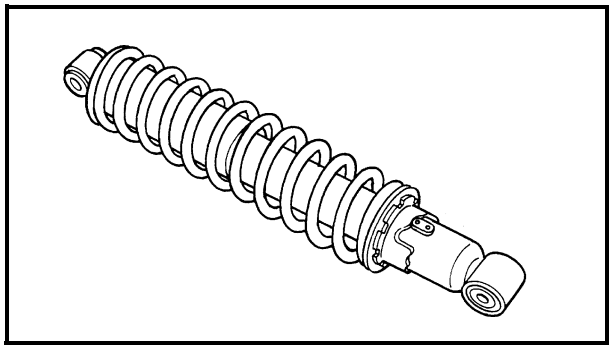
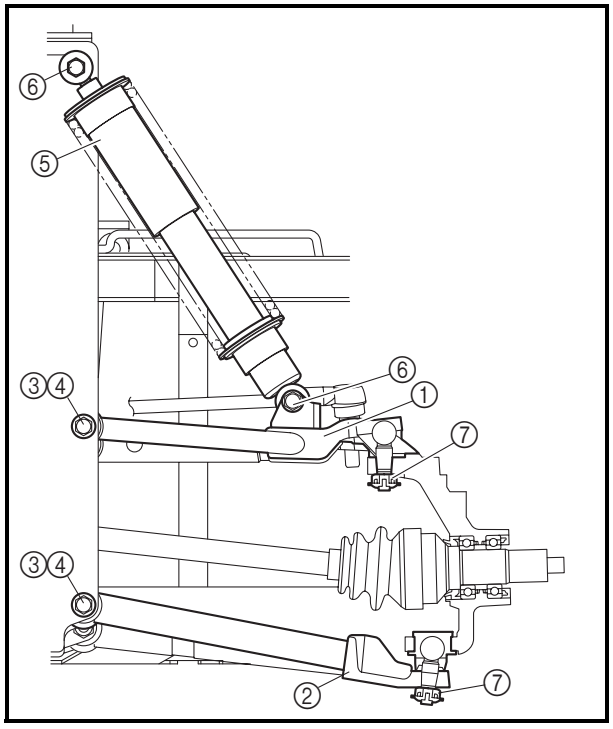


CHECKING THE FRONT SHOCK ABSORBER

1. Check:
   - shock absorber rod
     Bends/damage → Replace the shock absorber assembly.
   - shock absorber assembly
     Oil leaks → Replace the shock absorber assembly.
   - spring
     Fatigue → Replace the shock absorber assembly.
     Move the spring up and down.



INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER

1. Install:
   - front arms
   - front shock absorber

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a. Install the front upper arm ① and front lower arm ②.

NOTE:

- Lubricate the bolts ③ with lithium-soap-based grease.
- Be sure to position the bolts ③ so that the bolt head faces outward.
- Temporarily tighten the nuts ④.

b. Install the front shock absorber ⑤.

	Nut ⑥ **45 Nm (4.5 m · kg, 32 ft · lb)**

c. Install the ball joints.

	Nut ⑦ **30 Nm (3.0 m · kg, 22 ft · lb)**

d. Install the new cotter pins.

e. Tighten the nuts ④.

	Nut ④ **45 Nm (4.5 m · kg, 32 ft · lb)**

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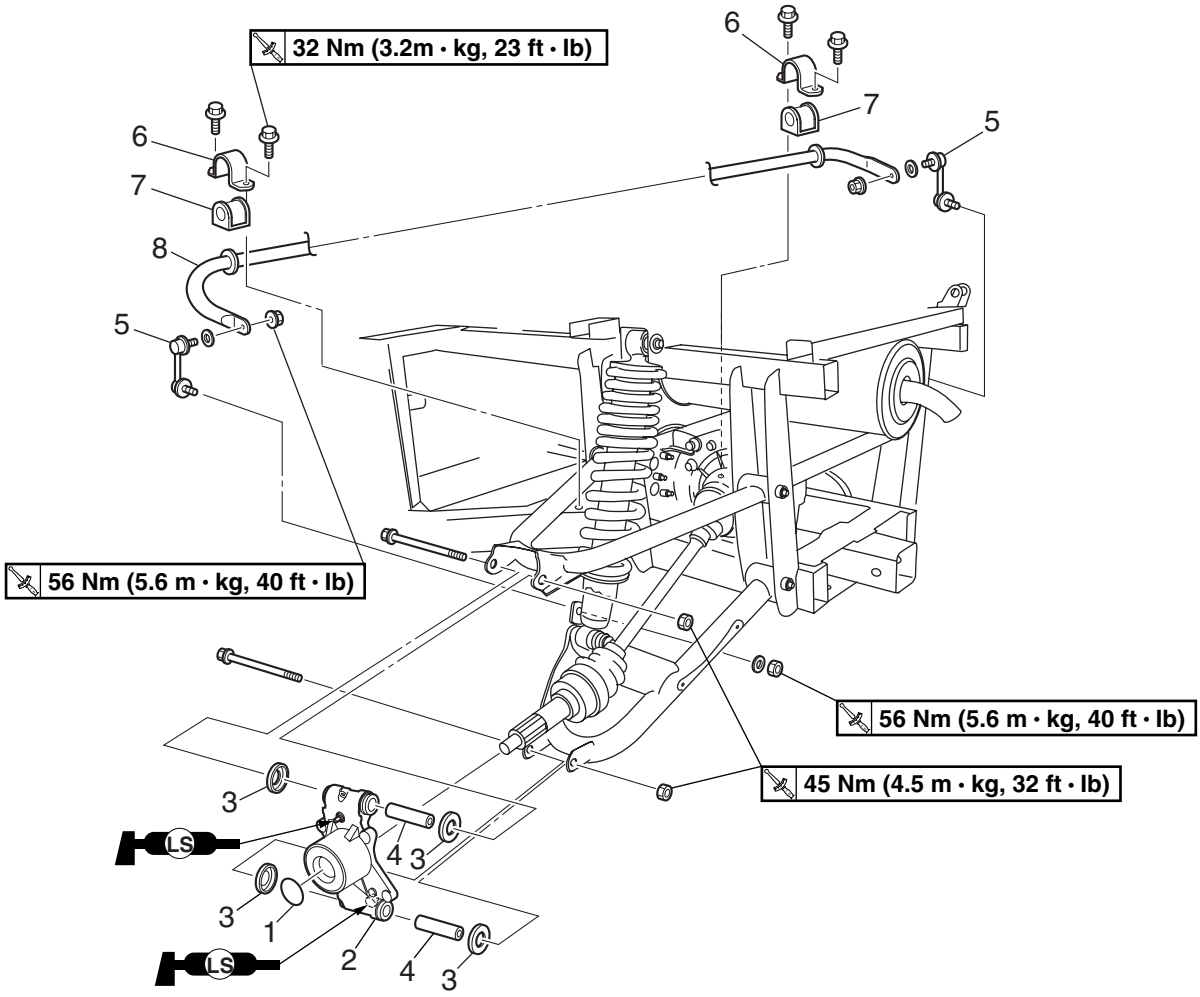
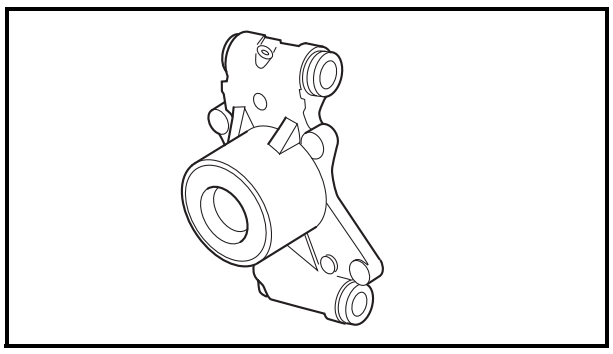
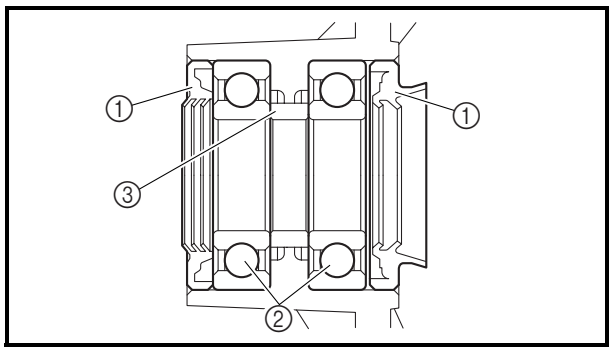
REAR KNUCKLE AND STABILIZER



Order	Job/Part	Q'ty	Remarks
	Removing the rear knuckle and stabilizer		Remove the parts in the order listed.
	Rear wheel hubs		Refer to "REAR WHEELS AND BRAKE DISC".
1	O-ring	1	
2	Rear knuckle	1	
3	Spacer cover	4	
4	Spacer	2	
5	Stabilizer joint	2	
6	Stabilizer holder	2	
7	Bushing	2	
8	Stabilizer	1	
			For installation, reverse the removal procedure.





CHECKING THE REAR KNUCKLE

1. Check:
   - rear knuckle
     Damage/pitting → Replace.
2. Check:
   - rear wheel bearings
     Bearings allow play in the wheel hubs or the wheel turns roughly → Replace.
   - oil seals
     Damage → Replace.

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a. Clean the outside of the rear knuckle.
b. Remove the oil seals ①.
c. Drive out the bearings ②.

⚠ WARNING

Eye protection is recommended when using striking tools.

d. Remove the spacer ③.
e. Apply lithium base grease to the bearings and oil seals.
f. Install the spacer to the rear knuckle.
g. Install the new bearings.

NOTE:

Install the outside bearing first.

CAUTION:

Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

h. Install a new oil seal.

NOTE:

When installing the oil seals, the “seal side” of the oil seal faces out.

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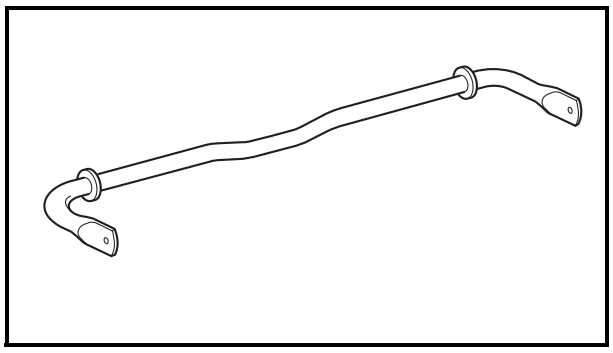
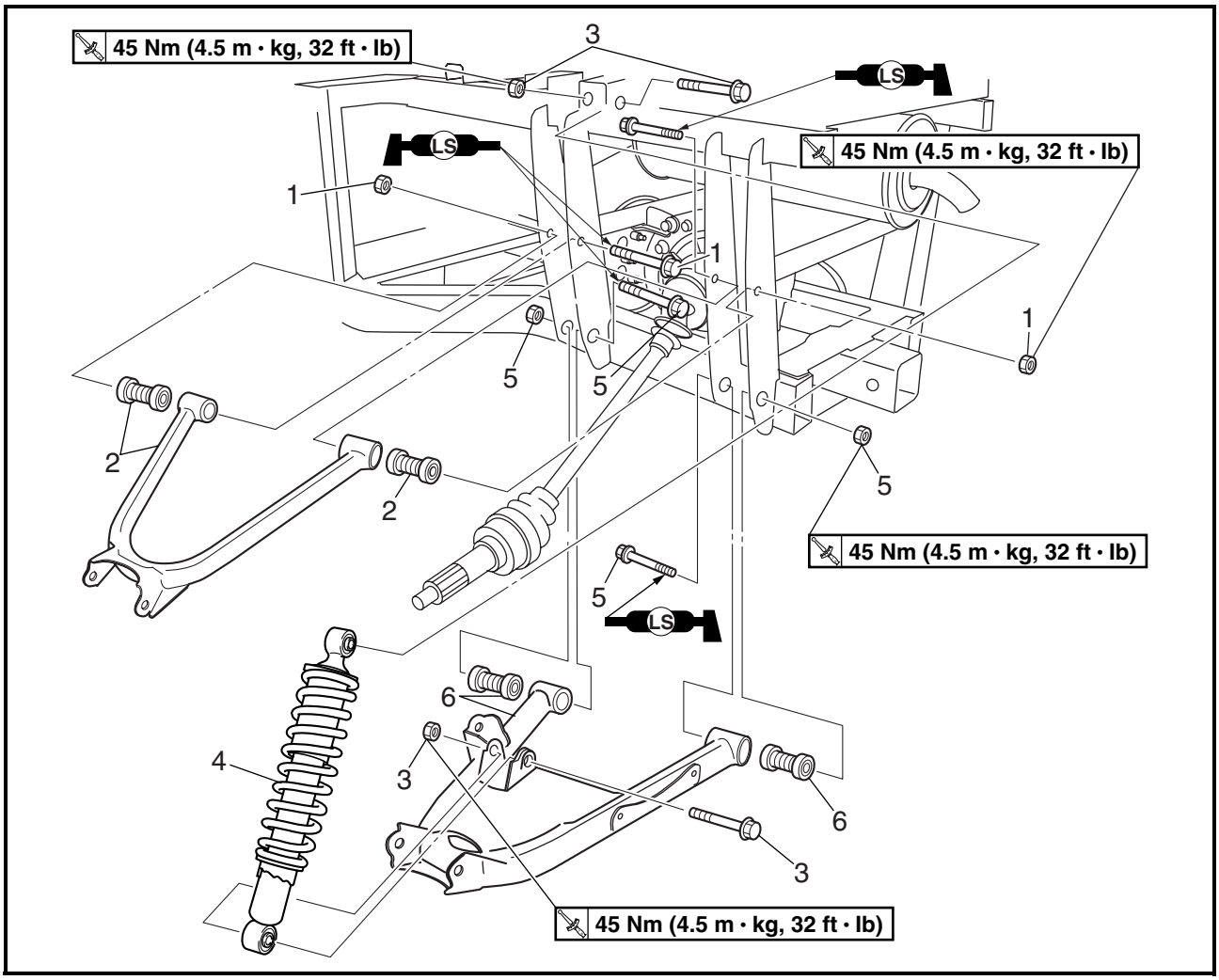


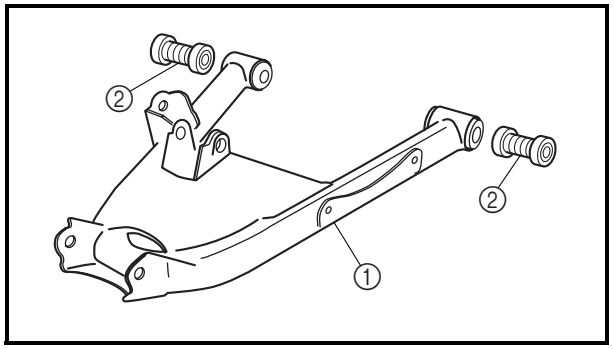
CHECKING THE STABILIZER

1. Check:
   - stabilizer
     Bends/cracks/damage → Replace.

REAR ARMS AND REAR SHOCK ABSORBER

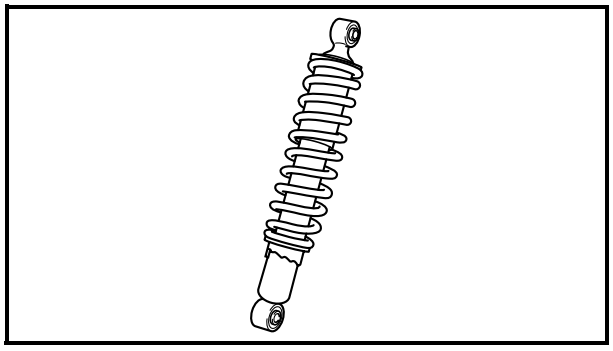


Order	Job/Part	Q'ty	Remarks
	Removing the rear arms and rear shock absorber		Remove the parts in the order listed.
	Rear knuckle/stabilizer		Refer to "REAR KNUCKLE AND STABILIZER".
1	Nut/bolt	2/2	Refer to "INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER".
2	Rear upper arm/bushing	1/2	
3	Nut/bolt	2/2	
4	Rear shock absorber	1	
5	Nut/bolt	2/2	
6	Rear lower arm/bushing	1/2	
			For installation, reverse the removal procedure.



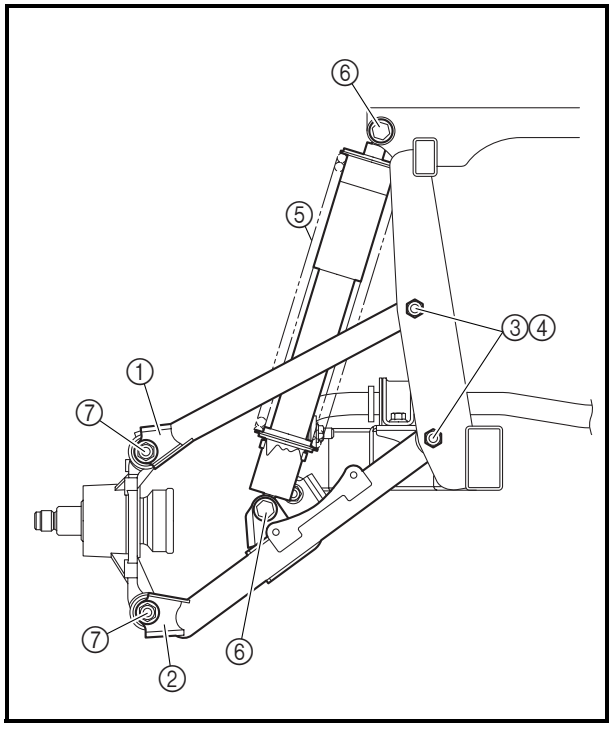
CHECKING THE REAR ARMS

1. Check:
   - rear arms ①
     Bends/damage → Replace.
2. Check:
   - bushings ②
     Wear/damage → Replace.



CHECKING THE REAR SHOCK ABSORBER

1. Check:
   - shock absorber rod
     Bends/damage → Replace the shock absorber assembly.
   - shock absorber assembly
     Oil leaks → Replace the shock absorber assembly.
   - spring
     Move the spring up and down.
     Fatigue → Replace the shock absorber assembly.



INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER

1. Install:
   - rear arms
   - rear shock absorber

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a. Install the rear upper arm ① and rear lower arm ②.

NOTE:

- Lubricate the bolts ③ with lithium-soap-based grease.
- Be sure to position the bolts ③ so that the bolt head faces inward.
- Temporarily tighten the nuts ④.

b. Install the rear shock absorber ⑤.

	Nut ⑥ **45 Nm (4.5 m · kg, 32 ft · lb)**

c. Install the rear knuckle.

	Nut ⑦ **45 Nm (4.5 m · kg, 32 ft · lb)**

d. Tighten the nuts ④.

	Nut ④ **45 Nm (4.5 m · kg, 32 ft · lb)**

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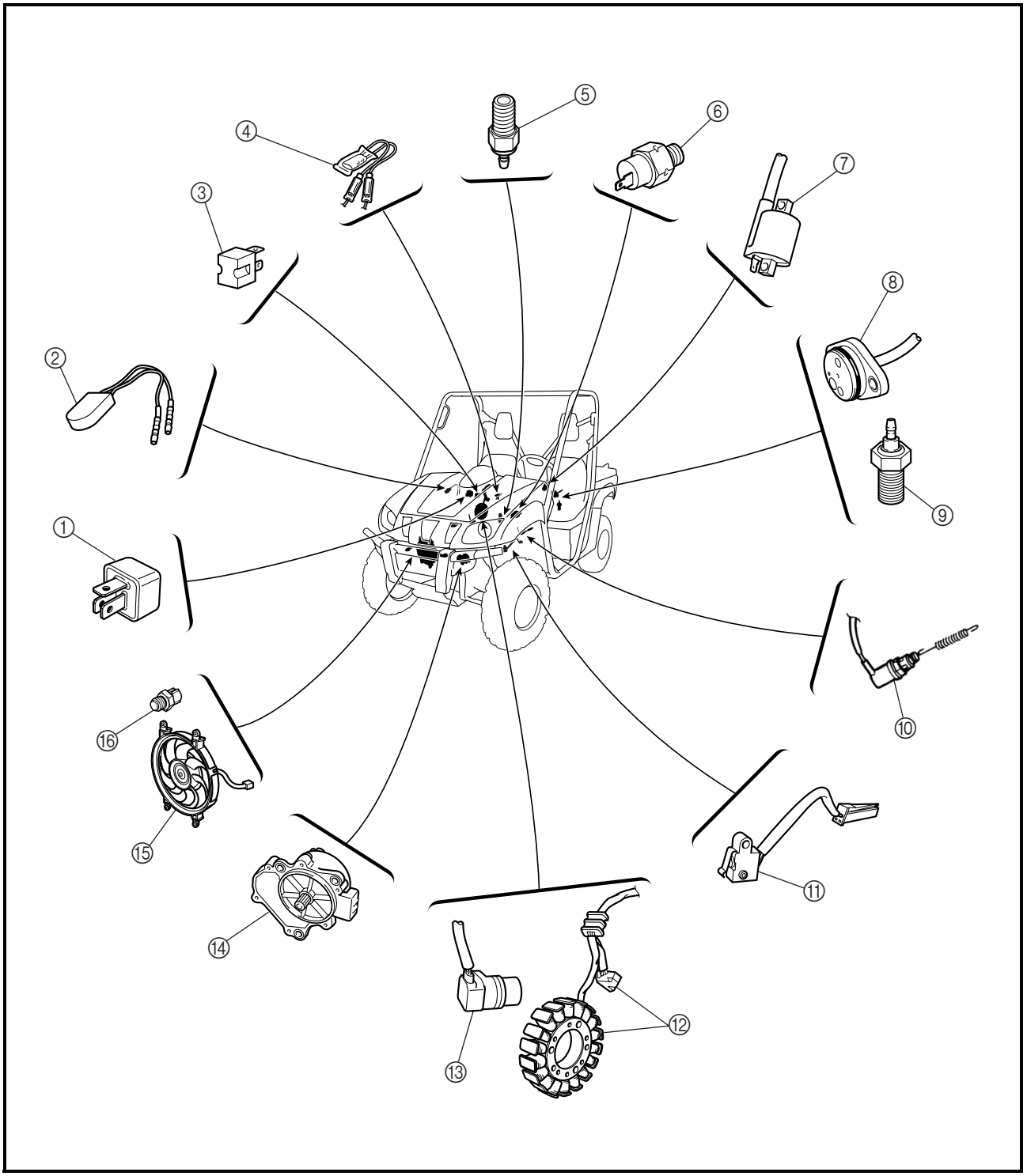
EB800000

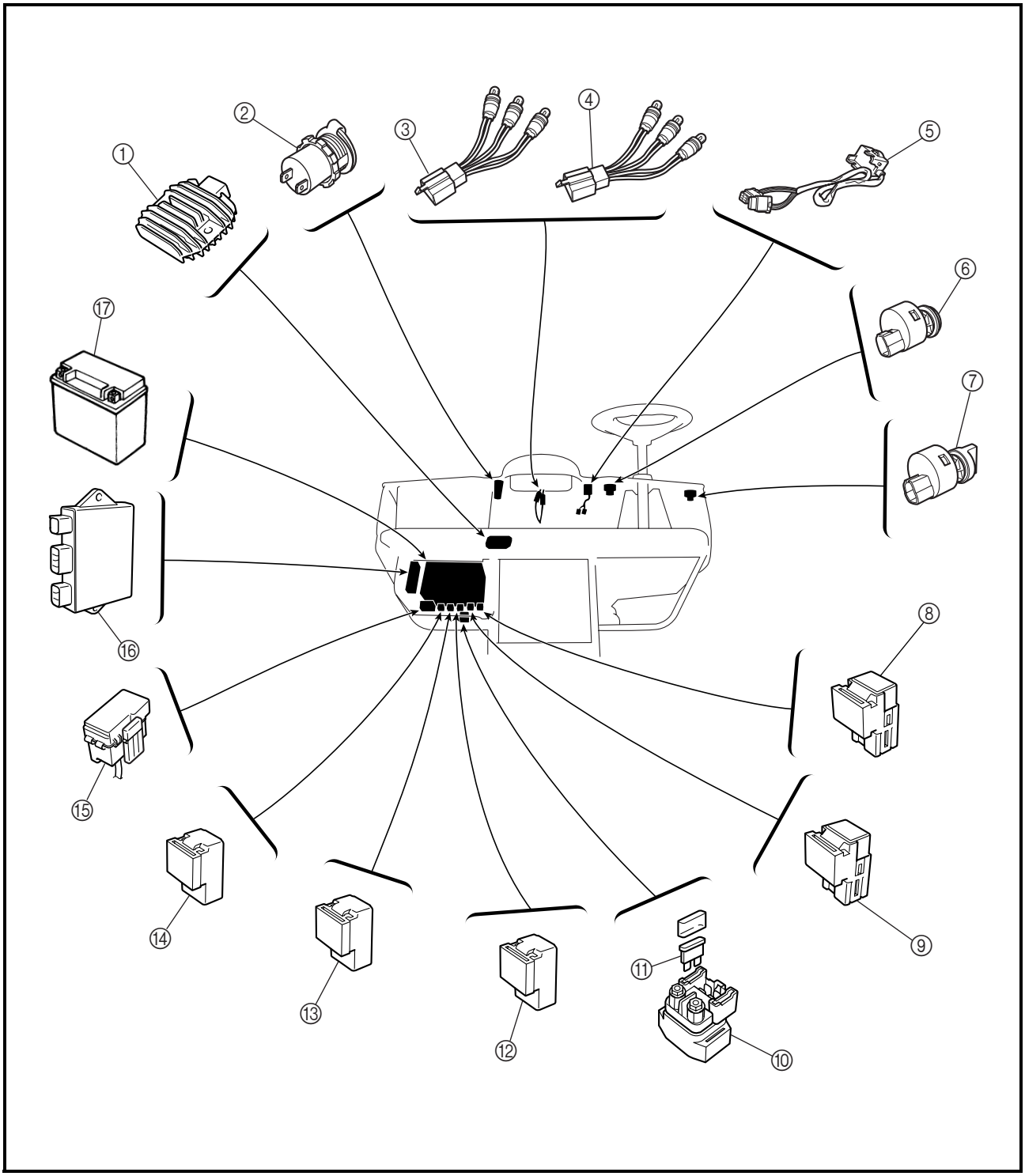
ELECTRICAL

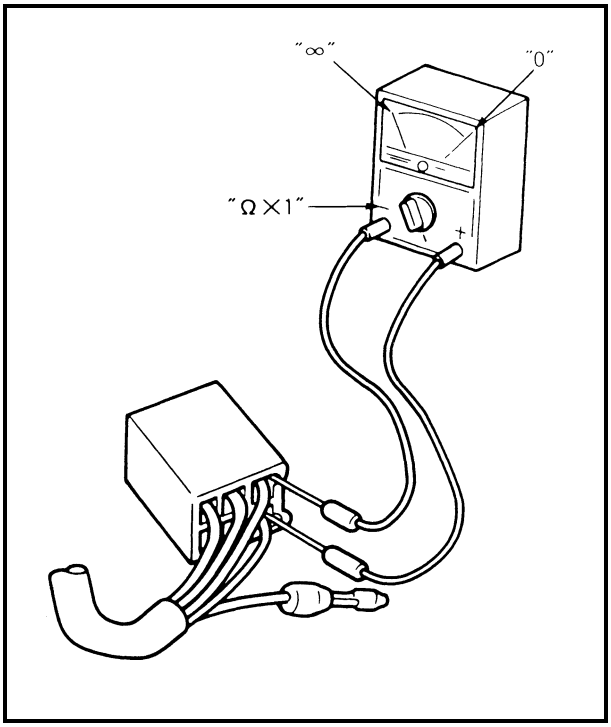
ELECTRICAL COMPONENTS

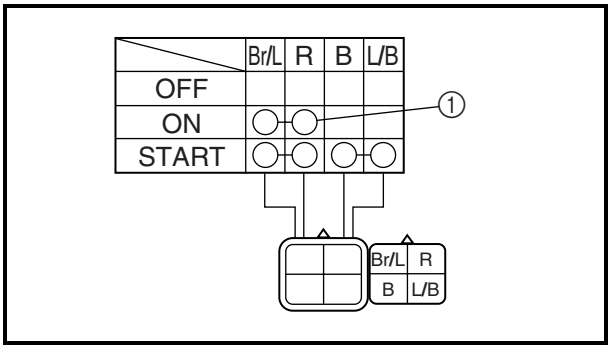
① Diode 1
② Thermo switch 2
③ Diode 2
④ Circuit breaker (radiator fan motor)
⑤ Carburetor heater
⑥ Thermo switch 1
⑦ Ignition coil
⑧ Gear position switch
⑨ Reverse switch
⑩ Brake light switch
⑪ Parking brake switch
⑫ Pickup coil/stator assembly
⑬ Speed sensor
⑭ Gear motor
⑮ Radiator fan
⑯ Thermo switch 3



① Rectifier/regulator
② Auxiliary DC jack
③ Indicator light assembly 1
④ Indicator light assembly 2
⑤ On-Command four-wheel drive switch and differential gear lock switch
⑥ Main switch
⑦ Light switch
⑧ Four-wheel drive relay 1
⑨ Four-wheel drive relay 2
⑩ Starter relay
⑪ Main fuse
⑫ Four-wheel drive relay 3
⑬ Differential gear lock indicator light relay
⑭ Four-wheel drive indicator light relay
⑮ Fuse box
⑯ C.D.I. unit
⑰ Battery







CHECKING THE SWITCH

CHECKING THE SWITCH

Use a pocket tester to check the terminals for continuity. If the continuity is faulty at any point, replace the switch.

	Pocket tester **P/N. YU-03112-C, 90890-03112**

NOTE:

- Set the pocket tester to "0" before starting the test.
- The pocket tester should be set to the "Ω × 1" range when testing the switch for continuity.
- Turn the switch on and off a few times when checking it.

CHECKING A SWITCH SHOWN IN THE MANUAL

The terminal connections for switches (main switch, light switch, etc.) are shown in a chart similar to the one on the left.

This chart shows the switch positions in the column and the switch lead colors in the top row.

For each switch position, "○——○" indicates the terminals with continuity.

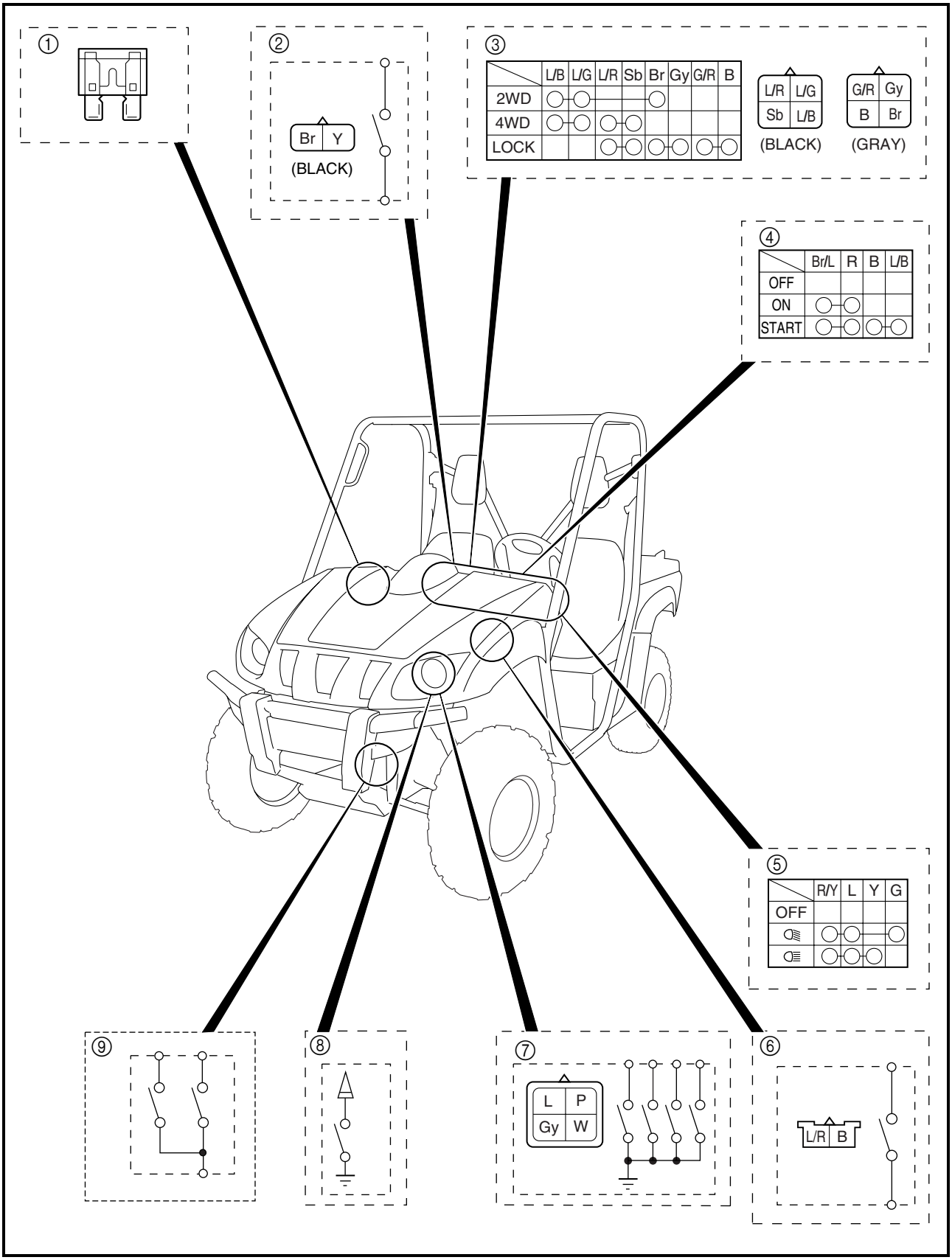
The example chart shows that:

① There is continuity between the "Brown/Blue and Red" leads when the switch is set to "ON".

CHECKING THE SWITCH CONTINUITY

Refer to “CHECKING THE SWITCH” and check for continuity between lead terminals.
Poor connection, no continuity → Correct or replace.

***** The coupler locations are circled.



① Fuse
② Brake light switch
③ On-Command four-wheel drive switch and differential gear lock switch
④ Main switch
⑤ Light switch
⑥ Parking brake switch
⑦ Gear position switch
⑧ Reverse switch
⑨ Four-wheel drive switch

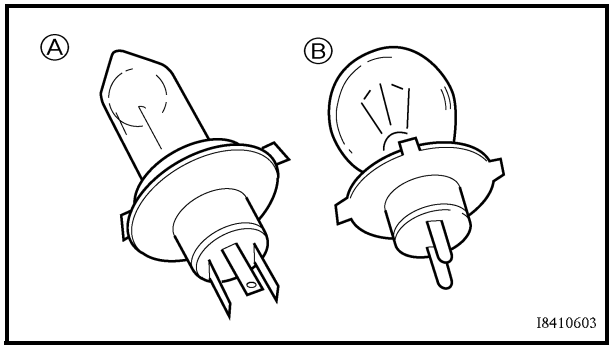
EB801020
CHECKING THE BULBS AND BULB SOCKETS

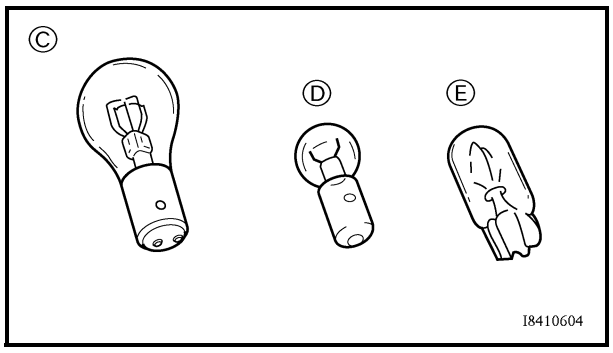
Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/wear → Repair or replace the bulb, bulb socket or both.

Improperly connected → Properly connect.

Incorrect continuity reading → Repair or replace the bulb, bulb socket or both.





TYPES OF BULBS

The bulbs used on this vehicle are shown in the illustration on the left.

- Bulbs Ⓐ and Ⓑ are used for headlights and usually use a bulb holder which must be detached before removing the bulb. The majority of these bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulb Ⓒ is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs Ⓓ and Ⓔ are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

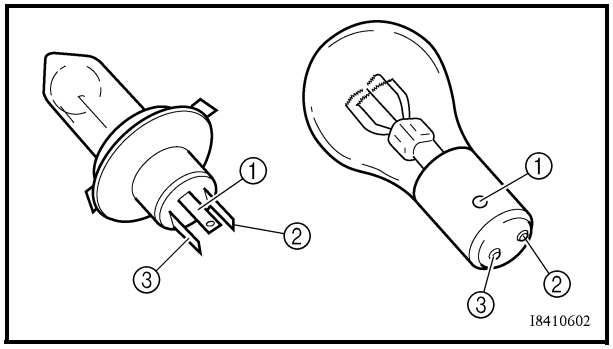
1. Remove:
   - bulb

⚠ WARNING

Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

CAUTION:

- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**



2. Check:
   - bulb (for continuity)
     (with the pocket tester)
     No continuity → Replace.

	Pocket tester **P/N. YU-03112-C, 90890-03112**

NOTE:

Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.

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a. Connect the tester (+) lead to terminal ① and the tester (–) lead to terminal ②, and check the continuity.
b. Connect the tester (+) lead to terminal ① and the tester (–) lead to terminal ③, and check the continuity.
c. If either of the readings indicate no continuity, replace the bulb.

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CHECKING THE CONDITION OF THE BULB SOCKETS

The following procedure applies to all of the bulb sockets.

1. Check:
   - Bulb socket (for continuity)
     (with the pocket tester)
     No continuity → Replace.

Pocket tester
P/N. YU-03112-C, 90890-03112

NOTE:

Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

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a. Install a good bulb into the bulb socket.
b. Connect the pocket tester probes to the respective leads of the bulb socket.
c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

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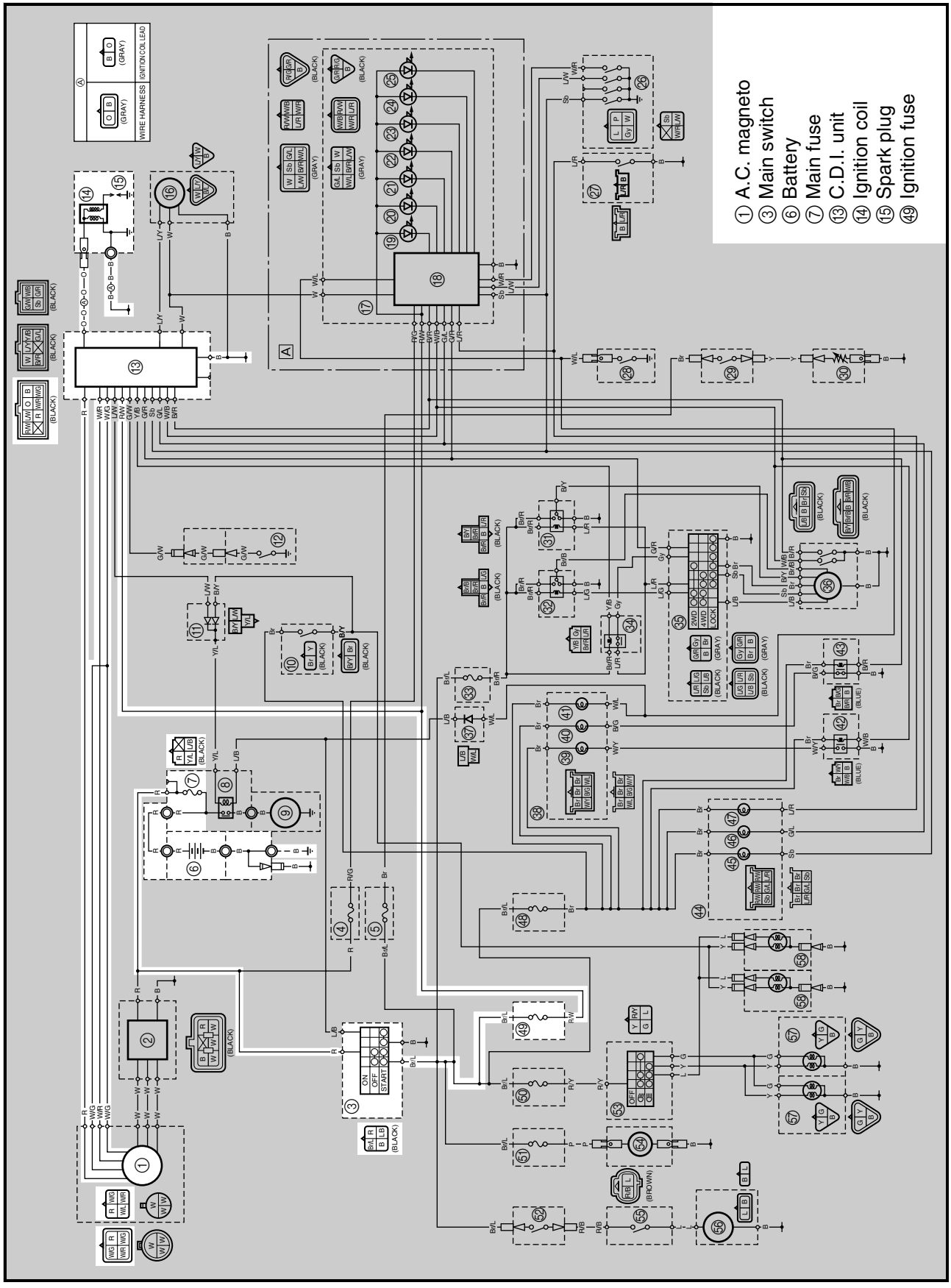
EB802000

IGNITION SYSTEM

CIRCUIT DIAGRAM



EB802010
TROUBLESHOOTING

IF THE IGNITION SYSTEM FAILS TO OPERATE (NO SPARK OR INTERMITTENT SPARK):

Procedure
Check:
1. Fuses (main, ignition)
2. Battery
3. Spark plug
4. Ignition spark gap
5. Spark plug cap resistance
6. Ignition coil resistance
7. Main switch
8. Pickup coil resistance
9. Rotor rotation direction detection coil resistance
10. Wiring connection (the entire ignition system)

NOTE:
- Remove the following part(s) before troubleshooting:
1) Console
2) Footrest cover
- Use the following special tool(s) for troubleshooting.

Pulse ignition spark checker
P/N. YM-34487
Ignition checker
P/N. 90890-06754
Pocket tester
P/N. YU-03112-C, 90890-03112

EB802011

1. Fuses (main, ignition)

Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ↓

EB802012

2. Battery

- Check the battery condition.
  Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage
12.8 V or more at 20 °C (68 °F)

INCORRECT → • Clean the battery terminals.
• Recharge or replace the battery.

CORRECT ↓

*

*

3. Spark plug

- Check the spark plug condition.
- Check the spark plug type.
- Check the spark plug gap.
  Refer to "CHECKING THE SPARK PLUG" in chapter 3.

Spark plug gap
0.8 ~ 0.9 mm (0.031 ~ 0.035 in)

Standard spark plug
DPR8EA-9/NGK

INCORRECT

Repair or replace the spark plug.

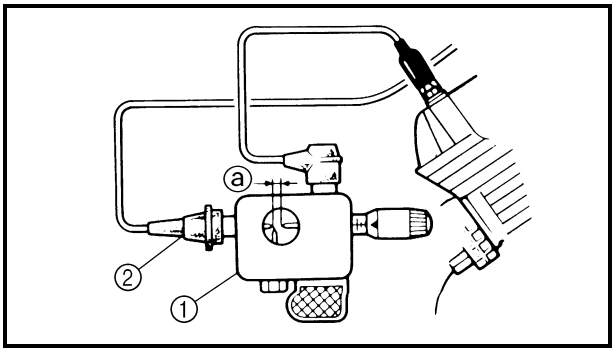
CORRECT

4. Ignition spark gap

- Disconnect the spark plug cap from the spark plug.
- Connect the pulse ignition spark checker or ignition checker ① as shown.

② Spark plug cap

- Turn the main switch to "ON".
- Check the ignition spark gap ⓐ.
- Crank the engine by pushing the starter switch, and increase the spark gap until a misfiring occurs.



Minimum spark gap
6.0 mm (0.24 in)

MEETS SPECIFICATION

The ignition system is not faulty.

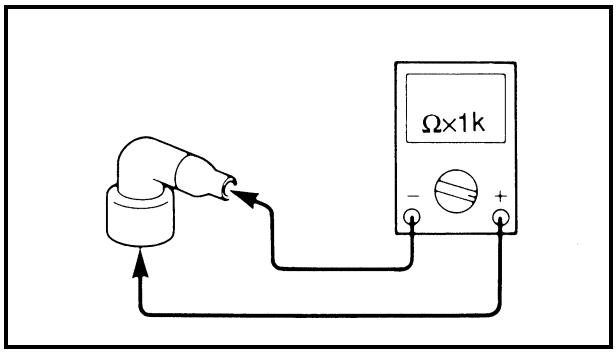
OUT OF SPECIFICATION OR NO SPARK

*

*

5. Spark plug cap resistance

- Remove the spark plug cap.
- Connect the pocket tester (Ω × 1k) to the spark plug cap.



- Check that the spark plug cap has the specified resistance.

Spark plug cap resistance
10 kΩ at 20 °C (68 °F)

OUT OF SPECIFICATION

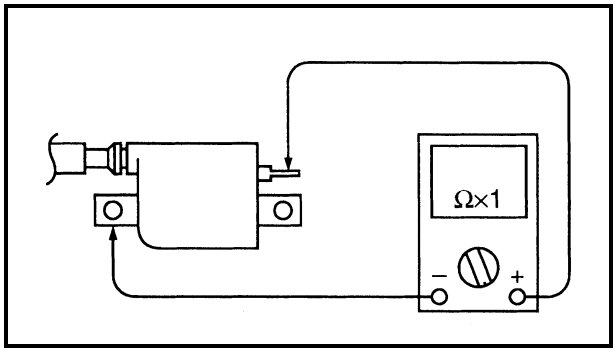
MEETS SPECIFICATION

Replace the spark plug cap.

6. Ignition coil resistance

- Disconnect the ignition coil connector from the wire harness.
- Connect the pocket tester (Ω × 1) to the ignition coil.

Tester (+) lead → Orange lead terminal
Tester (–) lead → Ignition coil base

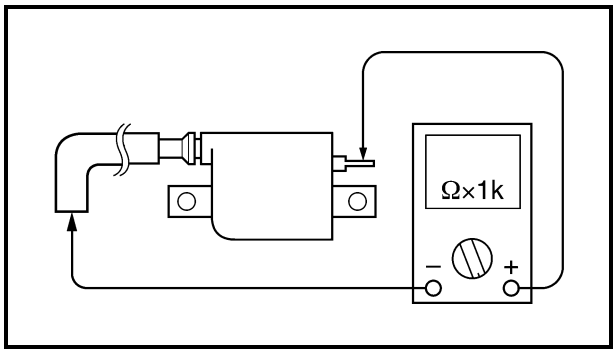


- Check that the primary coil has the specified resistance.

Primary coil resistance
0.18 ~ 0.28 Ω at 20 °C (68 °F)

- Connect the pocket tester (Ω × 1k) to the ignition coil.

Tester (+) lead → Orange lead terminal
Tester (–) lead → Spark plug lead



- Check that the secondary coil has the specified resistance.

Secondary coil resistance
6.32 ~ 9.48 kΩ at 20 °C (68 °F)

OUT OF SPECIFICATION

BOTH MEET SPECIFICATION

Replace the ignition coil.

*

*

7. Main switch

Refer to “CHECKING THE SWITCH”.

INCORRECT → Replace the main switch.

CORRECT

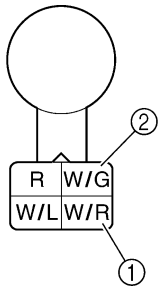
8. Pickup coil resistance

- Disconnect the A.C. magneto coupler from the wire harness.
- Connect the pocket tester (Ω × 100) to the pickup coil terminal.

Tester (+) lead → White/Red terminal ①
Tester (–) lead → White/Green terminal ②

- Check the pickup coil for the specified resistance.

Pickup coil resistance
459 ~ 561 Ω at 20 °C (68 °F)
(White/Red – White/Green)



OUT OF SPECIFICATION → Replace the pickup coil/stator assembly.

MEETS SPECIFICATION

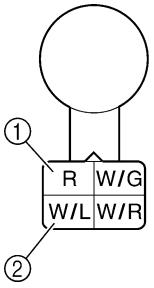
9. Rotor rotation direction detection coil resistance

- Disconnect the A.C. magneto coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the rotor rotation direction detection coil terminal.

Tester (+) lead → Red terminal ①
Tester (–) lead → White/Blue terminal ②

- Check the rotor rotation direction detection coil for the specified resistance.

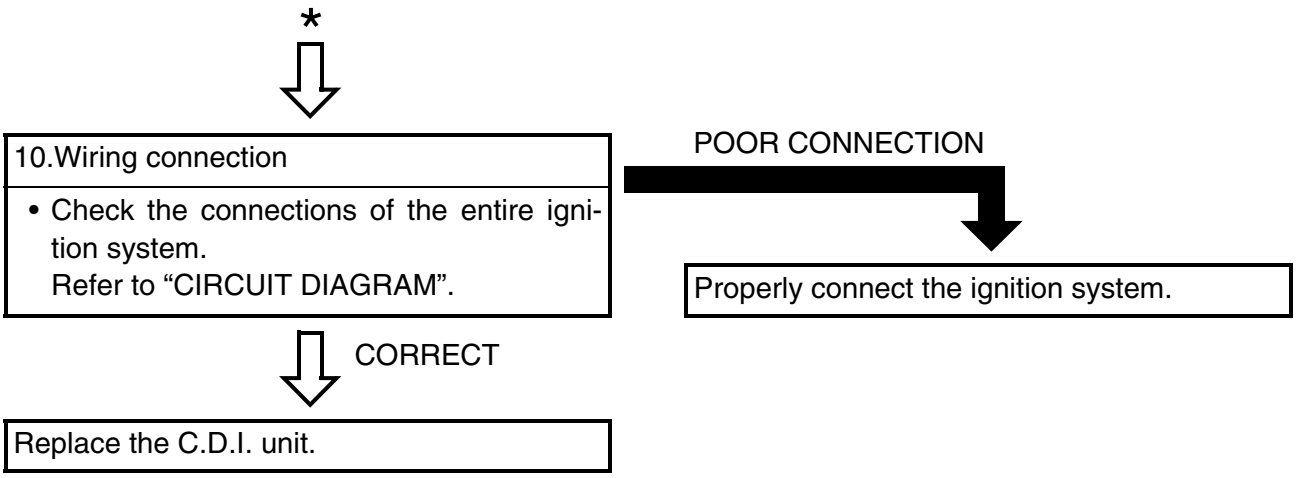
Rotor rotation direction detection coil resistance
0.063 ~ 0.077 Ω at 20 °C (68 °F)
(Red – White/Blue)



OUT OF SPECIFICATION → Replace the pickup coil/stator assembly.

MEETS SPECIFICATION

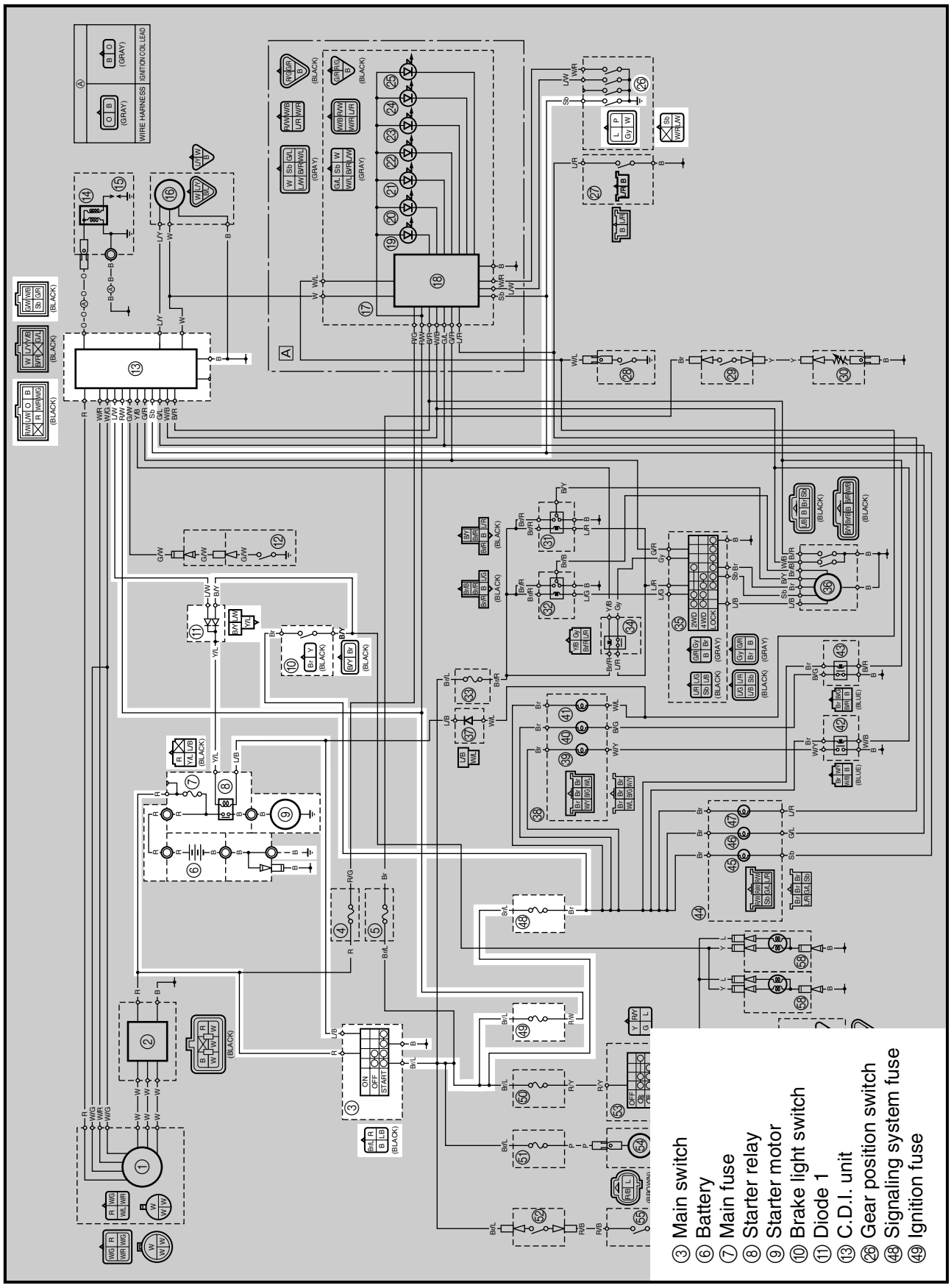
*

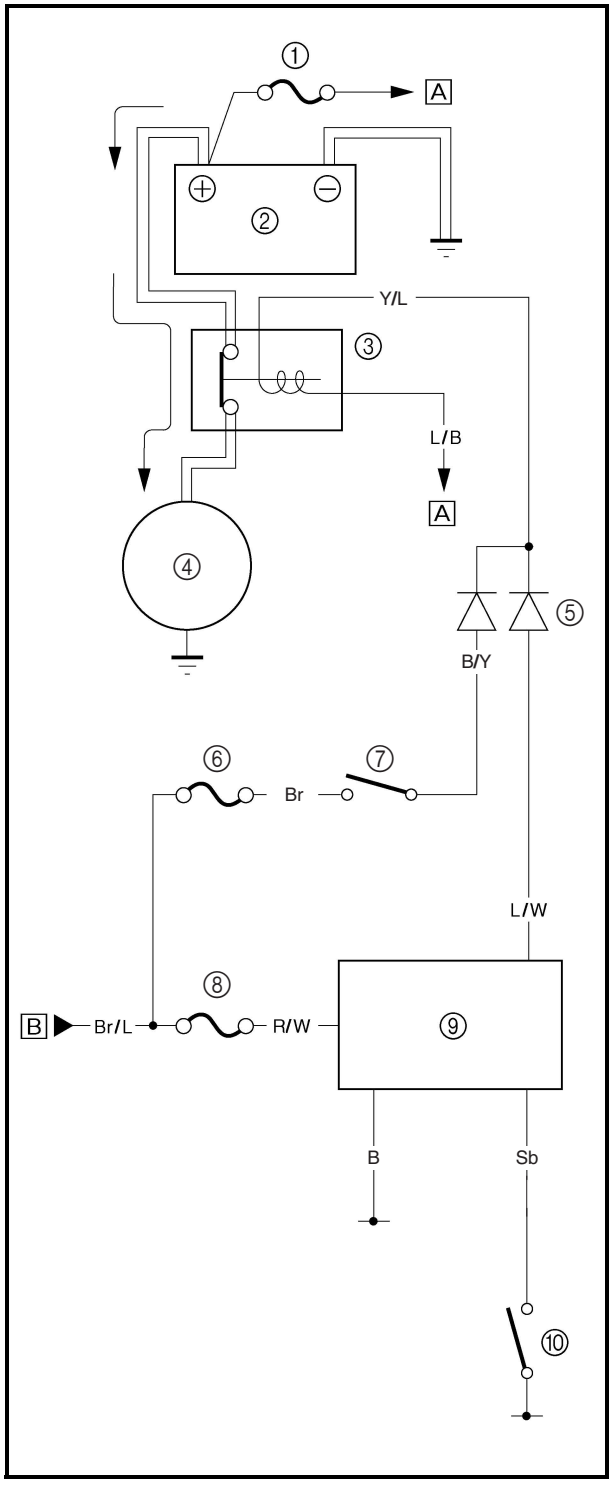

*
10.Wiring connection
• Check the connections of the entire ignition system.
Refer to “CIRCUIT DIAGRAM”.
POOR CONNECTION
Properly connect the ignition system.
CORRECT
Replace the C.D.I. unit.

EB803000

ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM





STARTING CIRCUIT OPERATION

The starting circuit on this model consists of the starter motor, starter relay, brake light switch, C.D.I. unit and gear position switch. If the main switch is "START" position, the starter motor can be operated only if:

- The transmission is in neutral (the gear position switch is in the neutral gear position).

or

- The brake pedal is pressed (the brake light switch is closed).

① Main fuse
② Battery
③ Starter relay
④ Starter motor
⑤ Diode 1
⑥ Signaling system fuse
⑦ Brake light switch
⑧ Ignition fuse
⑨ C.D.I. unit
⑩ Gear position switch
[A] TO MAIN SWITCH
[B] FROM MAIN SWITCH

EB803020
TROUBLESHOOTING

IF THE STARTER MOTOR FAILS TO OPERATE:

Procedure
Check:
1. Fuses (main, ignition, signaling system)
2. Battery
3. Starter motor
4. Starter relay
5. Main switch
6. Gear position switch
7. Brake light switch
8. Diode 1
9. Wiring connection (the entire starting system)

NOTE:
- Remove the following part(s) before troubleshooting:
1) Console
- Use the following special tool(s) for troubleshooting.

Pocket tester
P/N. YU-03112-C, 90890-03112

EB802011

1. Fuses (main, ignition, signaling system)

Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ⇩

EB802012

2. Battery

- Check the battery condition. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage
12.8 V or more at 20 °C (68 °F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.

CORRECT ⇩

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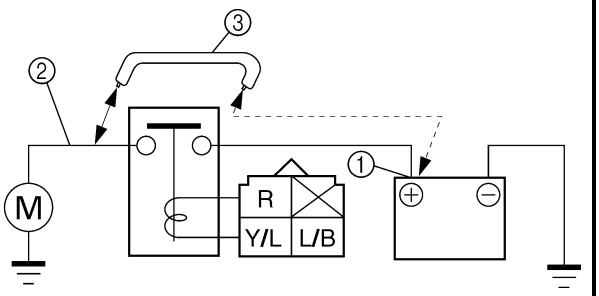
*

3. Starter motor

- Connect the battery (+) terminal ① and starter motor cable ② using a jumper lead ③ *.
- Check the operation of the starter motor.



*

⚠ WARNING

- **A wire that is used as a jumper lead must have the equivalent capacity or more as that of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, so be sure that no flammable gas or fluid is in the vicinity.**

DOES NOT TURN

Repair or replace the starter motor.

TURNS

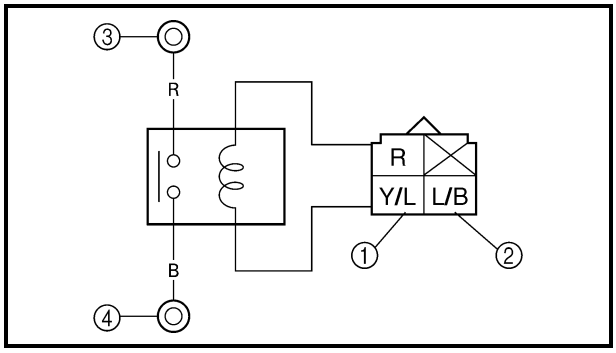
4. Starter relay

- Remove the starter relay from the wire harness.
- Connect the pocket tester (Ω × 1) and the battery (12 V) to the starter relay terminals.

Battery (+) terminal →
Yellow/Blue terminal ①
Battery (–) terminal →
Blue/Black terminal ②

Tester (+) lead → Red terminal ③
Tester (–) lead → Black terminal ④

- Check the starter relay for continuity.



NO CONTINUITY

Replace the starter relay.

CONTINUITY

5. Main switch

Refer to “CHECKING THE SWITCH”.

INCORRECT

Replace the main switch.

CORRECT

*

*

6. Gear position switch

Refer to “CHECKING THE SWITCH”.

INCORRECT → Replace the gear position switch.

CORRECT

7. Brake light switch

Refer to “CHECKING THE SWITCH”.

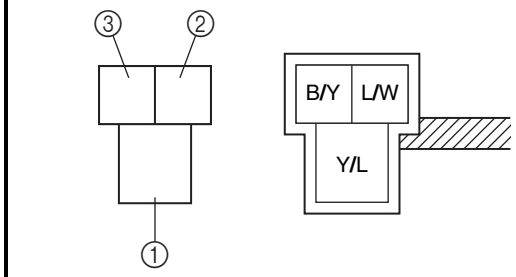
INCORRECT → Replace the brake light switch.

CORRECT

8. Diode 1

- Remove the diode from the coupler.
- Connect the pocket tester (Ω × 1) to the diode terminals as shown.
- Check the diode for continuity as follows.

Tester (+) lead → Yellow/Blue terminal ① **Tester (–) lead → Black/Yellow terminal ②**	**Continuity**
Tester (+) lead → Yellow/Blue terminal ① **Tester (–) lead → Blue/White terminal ③**	**Continuity**
Tester (+) lead → Black/Yellow terminal ② **Tester (–) lead → Yellow/Blue terminal ①**	**No continuity**
Tester (+) lead → Blue/White terminal ③ **Tester (–) lead → Yellow/Blue terminal ①**	**No continuity**



NOTE:
When you switch the tester’s positive and negative probes, the readings in the left chart will be reversed.

INCORRECT → Replace the diode 1.

CORRECT

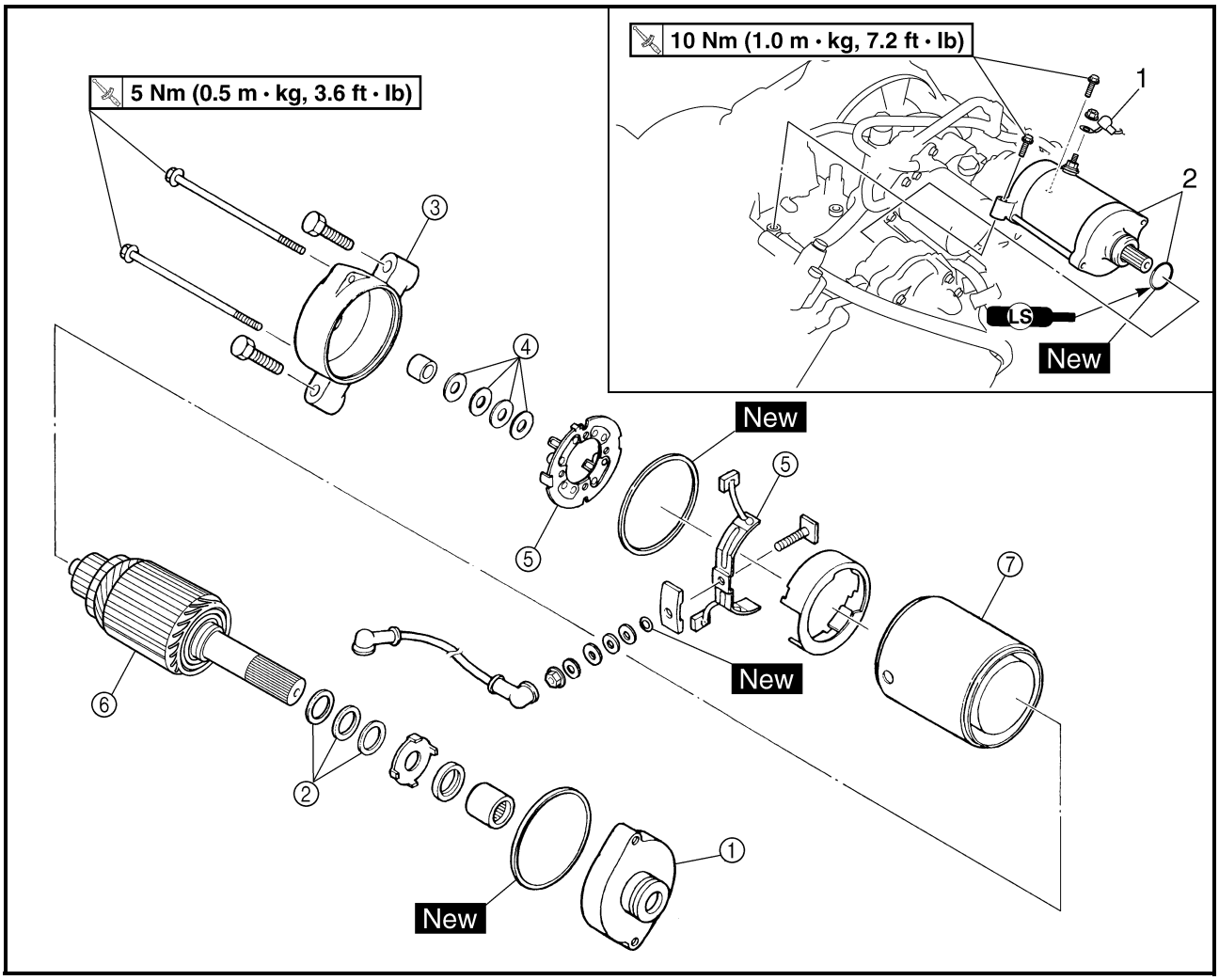
EB803028

9. Wiring connection

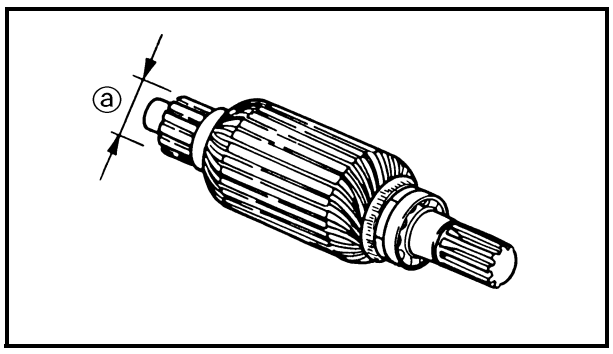
- Check the connections of the entire starting system.
  Refer to “CIRCUIT DIAGRAM”.

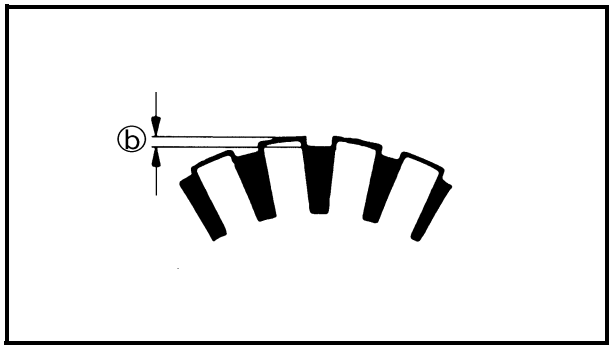
POOR CONNECTION → Properly connect the starting system.

STARTER MOTOR



Order	Job/Part	Q'ty	Remarks
	Removing the starter motor		Remove the parts in the order listed.
1	Starter motor lead	1	
2	Starter motor/O-ring	1/1	
			For installation, reverse the removal procedure.
	Disassembling the starter motor		Remove the parts in the order listed.
①	Bracket 1	1	Refer to "ASSEMBLING THE STARTER MOTOR".
②	Washer kit	1	
③	Bracket 2	1	
④	Shims		
⑤	Brush seat 1/brush seat 2	1/1	
⑥	Armature coil	1	
⑦	Yoke	1	
			For assembly, reverse the disassembly procedure.





CHECKING THE STARTER MOTOR

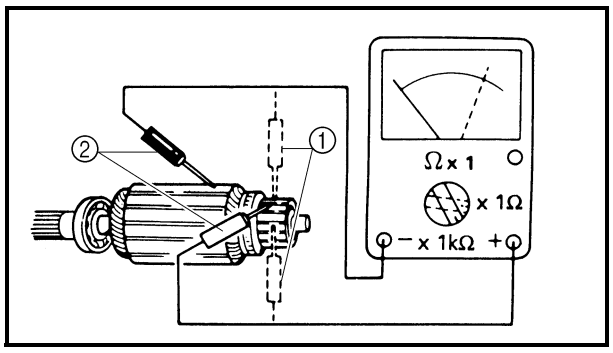
1. Check:
   - commutator
     Dirty → Clean it with #600 grit sandpaper.
2. Measure:
   - commutator diameter ⓐ
     Out of specification → Replace the starter motor.

Outside diameter
28 mm (1.10 in)
<Wear limit>:
27 mm (1.06 in)

3. Measure:
   - mica undercut ⓑ
     Out of specification → Scrape the mica using a hacksaw blade.

Mica undercut
0.7 mm (0.03 in)

NOTE:
Scrape the mica to the proper measurement using a hacksaw blade which has been grounded to fit the commutator.



4. Check:
   - armature coil (insulation/continuity)
     Defects → Replace the starter motor.

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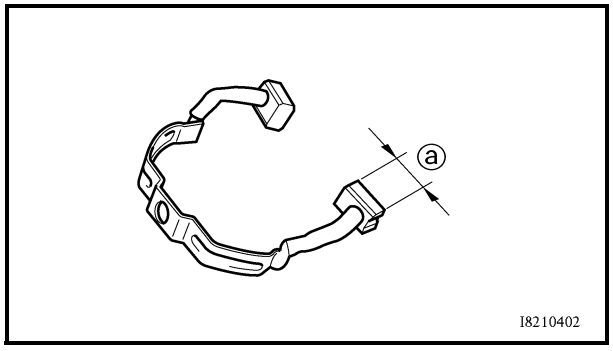
a. Connect the pocket tester for the continuity check ① and insulation check ②.
b. Measure the armature resistances.

Armature coil resistance
Continuity check
0.025 ~ 0.035 Ω at 20 °C (68 °F)
Insulation check
More than 1 MΩ at 20 °C (68 °F)

c. If the resistance is incorrect, replace the starter motor.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲



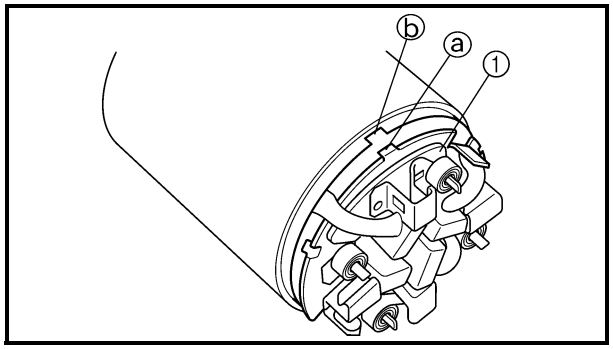
5. Measure:
   • brush length ⓐ (each)
   Out of specification → Replace the brush.

Brush length
12.5 mm (0.49 in)
<Wear limit>:
5 mm (0.20 in)

6. Measure:
   • brush spring force
   Fatigue/out of specification → Replace as a set.

Brush spring force
7.65 ~ 10.01 Nm
(780 ~ 1,021 g, 27.5 ~ 36.0 oz)

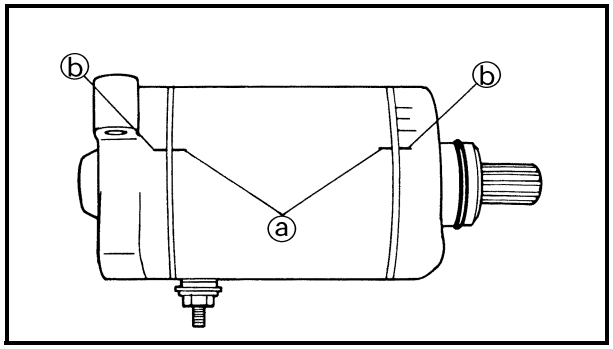
7. Check:
   • oil seal
   • bushing
   • O-rings
   Wear/damage → Replace.



ASSEMBLING THE STARTER MOTOR

1. Install:
   • brush seat 1 ①

NOTE:
Align the projection ⓐ on the brush seat 1 with the slot ⓑ on the yoke.



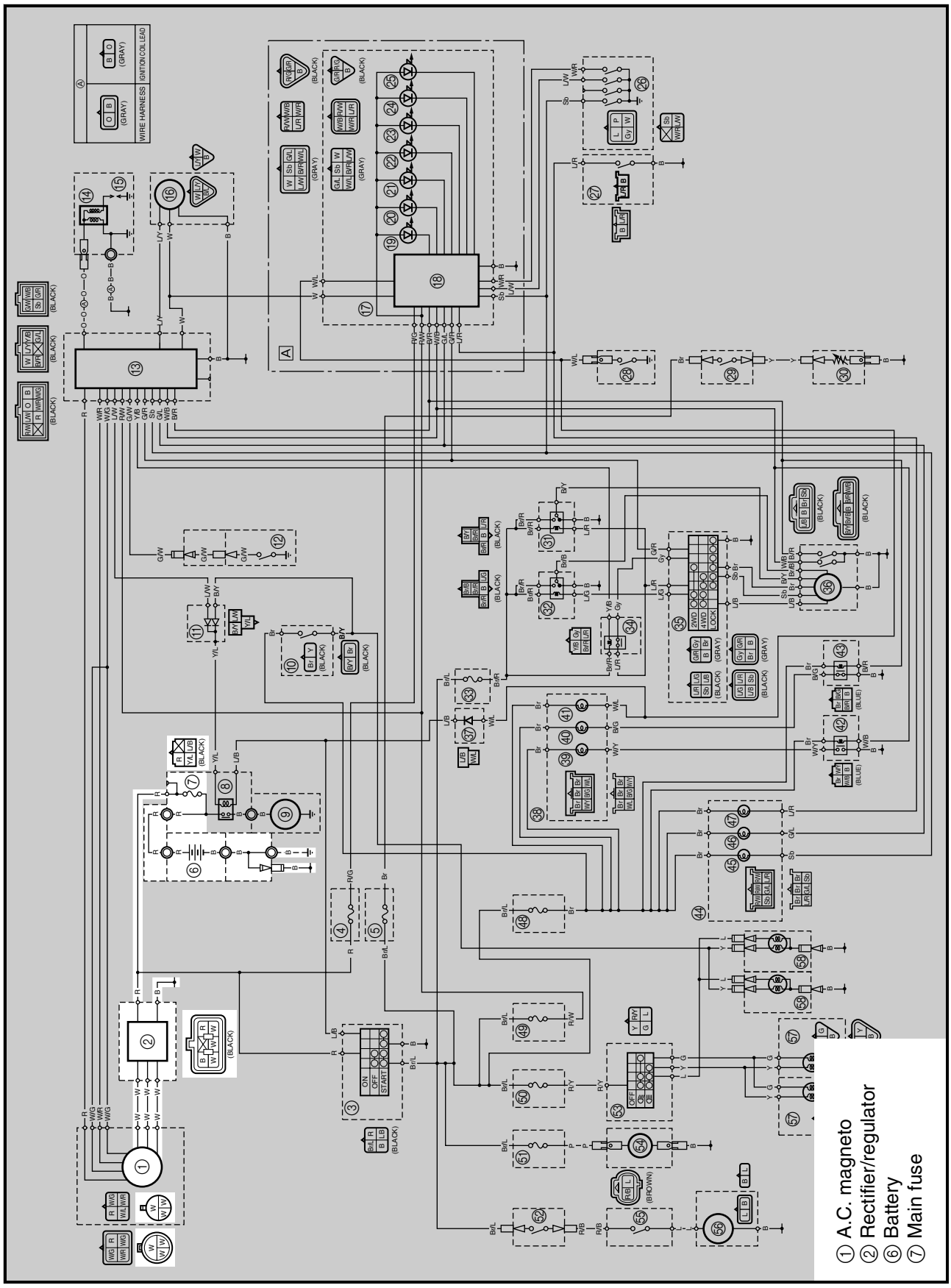
2. Install:
   • yoke
   • brackets

NOTE:
Align the match marks ⓐ on the yoke with the match marks ⓑ on the brackets.

EB804000

CHARGING SYSTEM

CIRCUIT DIAGRAM



EB804010
TROUBLESHOOTING

IF THE BATTERY IS NOT CHARGED:

Procedure
Check:
1. Fuse (main)
2. Battery
3. Charging voltage
4. Charging coil resistance
5. Wiring connections
   (the entire charging system)

NOTE:
- Remove the following part(s) before trouble-shooting:

1) Console
2) Footrest cover

- Use the following special tool(s) for trouble-shooting.

Digital engine test tachometer
P/N. YU-8036-C
Engine tachometer
P/N. 90890-03113
Pocket tester
P/N. YU-03112-C, 90890-03112

EB802011

1. Fuse (main)

Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the fuse.

CONTINUITY ↓

EB802012

2. Battery

- Check the battery condition.
  Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage
12.8 V or more at 20 °C (68 °F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.

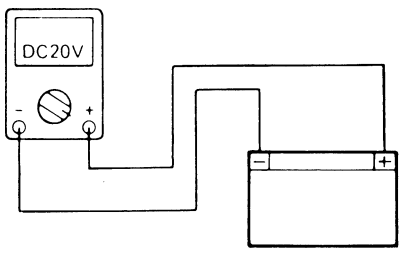
CORRECT ↓

EB804011

3. Charging voltage

- Connect the engine tachometer to the spark plug lead.
- Connect the pocket tester (DC 20 V) to the battery.

Tester (+) lead → Battery (+) terminal
Tester (–) lead → Battery (–) terminal



- Start the engine and accelerate to about 1,000 r/min.

Charging voltage
14 V at 1,000 r/min

NOTE:
Use a fully charged battery.

MEETS SPECIFICATION → The charging circuit is not faulty.

OUT OF SPECIFICATION

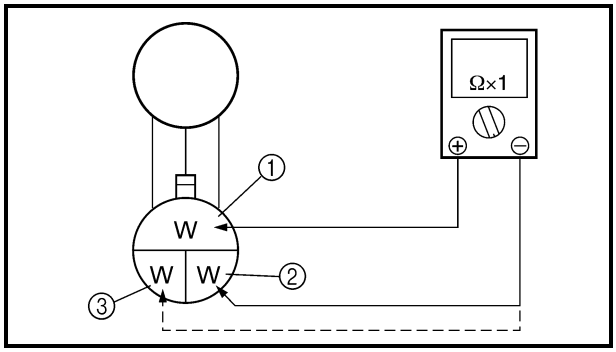
EB804012

4. Charging coil resistance

- Disconnect the A.C. magneto coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the charging coils.

Tester (+) lead → White terminal ①
Tester (–) lead → White terminal ②

Tester (+) lead → White terminal ①
Tester (–) lead → White terminal ③



- Measure the charging coil resistance.

Charging coil resistance
0.32 ~ 0.43 Ω at 20 °C (68 °F)

OUT OF SPECIFICATION → Replace the pickup coil/stator assembly.

MEETS SPECIFICATION

EB804015

5. Wiring connections

- Check the connections of the entire charging system.
  Refer to “CIRCUIT DIAGRAM”.

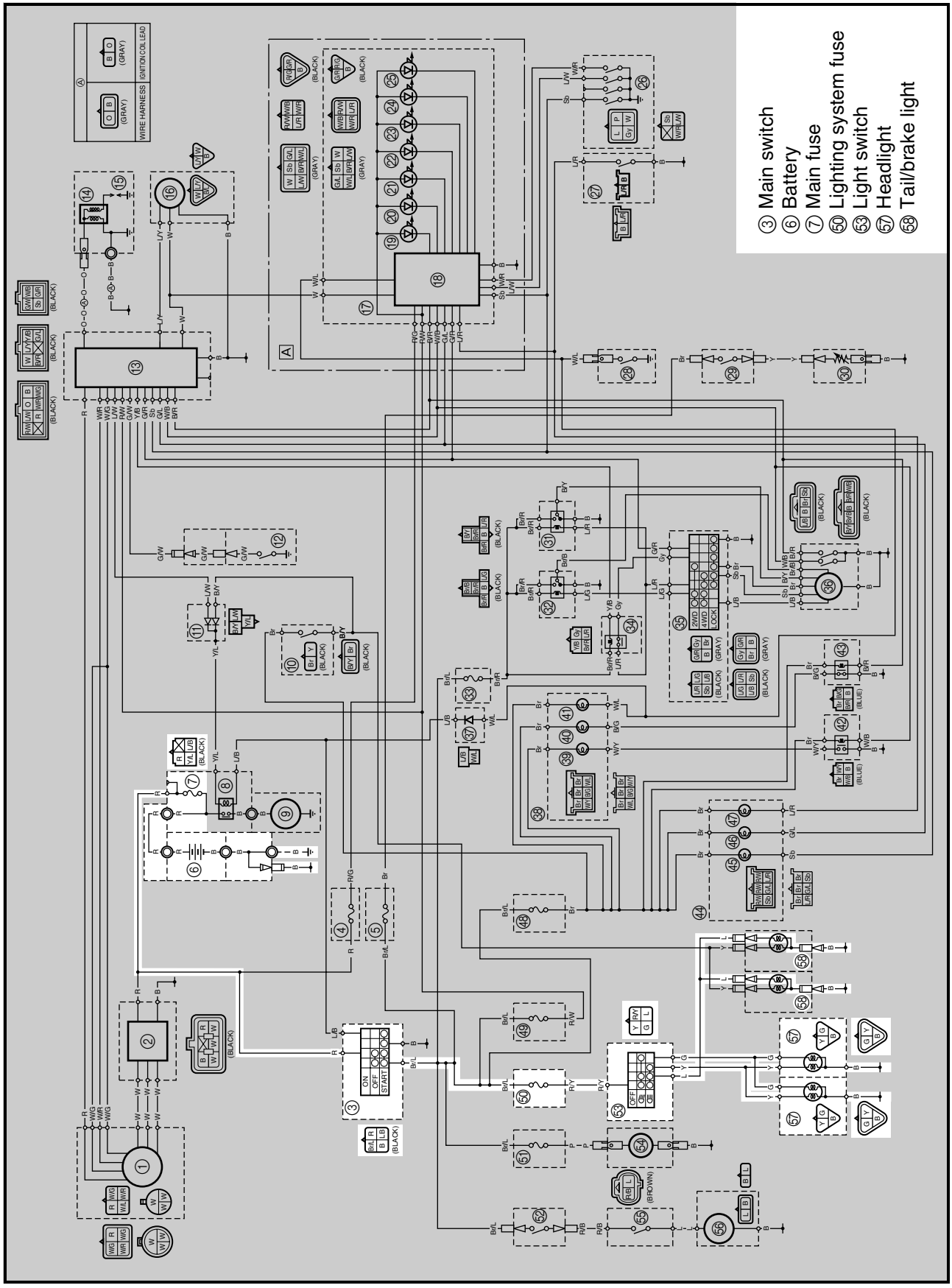
POOR CONNECTION → Properly connect the charging system.

CORRECT → Replace the rectifier/regulator.

EB805000

LIGHTING SYSTEM

CIRCUIT DIAGRAM



EB805010
TROUBLESHOOTING

IF THE HEADLIGHT AND/OR TAILLIGHT FAIL TO COME ON:

Procedure
Check:
1. Fuses (main, lighting system)
2. Battery
3. Main switch
4. Light switch
5. Wiring connections
   (the entire lighting system)

NOTE:
- Remove the following part(s) before troubleshooting:
1) Console
- Use the following special tool(s) for troubleshooting.

Pocket tester
P/N. YU-03112-C, 90890-03112

EB802011

1. Fuses (main, lighting system)

Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ↓

EB802012

2. Battery

- Check the battery condition.
  Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage
12.8 V or more at 20 °C (68 °F)

INCORRECT → • Clean the battery terminals.
• Recharge or replace the battery.

CORRECT ↓

3. Main switch

Refer to “CHECKING THE SWITCH”.

INCORRECT → Replace the main switch.

CORRECT ↓

*

*

4. Light switch
Refer to “CHECKING THE SWITCH”.

INCORRECT → Replace the light switch.

CORRECT

EB805013

5. Wiring connection
• Check the connections of the entire lighting system. Refer to “CIRCUIT DIAGRAM”.

POOR CONNECTION → Properly connect the lighting system.

CORRECT

Check the condition of each of the lighting system’s circuits.
Refer to “CHECKING THE LIGHTING SYSTEM”.

EB805020

CHECKING THE LIGHTING SYSTEM

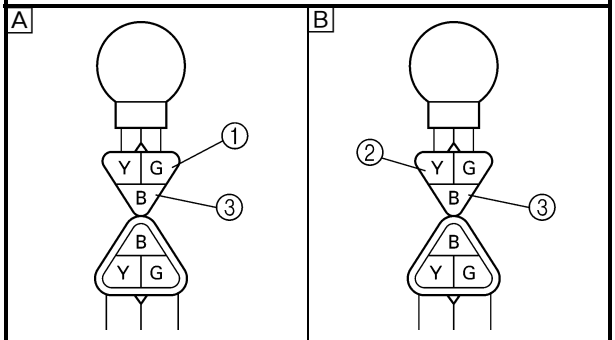
1. If the headlights fail to come on:

1. Bulb and bulb socket
• Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ↓

2. Voltage
• Connect the pocket tester (DC 20 V) to the headlight couplers.



Tester (+) lead →
Green terminal ① or Yellow terminal ②
Tester (–) lead → Black terminal ③

A When the light switch is on " Ⓛ≣ ".
B When the light switch is on " Ⓗ≣ ".

- Turn the main switch to "ON".
- Turn the light switch to " Ⓛ≣ " or " Ⓗ≣ ".
- Check the voltage (12 V) of the "Green" and "Yellow" leads on the bulb socket connector.

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ↓

This circuit is not faulty.

EB805021

2. If the taillights fail to come on:

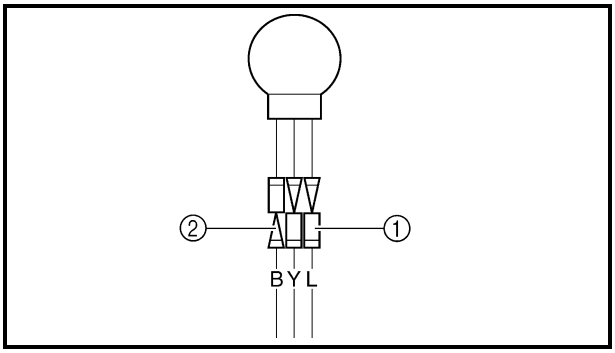
1. Bulb and bulb socket
   - Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ⇩

2. Voltage
   - Connect the pocket tester (DC 20 V) to the tail/brake light connectors.

Tester (+) lead → Blue lead terminal ①
Tester (–) lead → Black lead terminal ②



- Turn the main switch to “ON”.
- Turn the light switch to “ Ⓛ≣ ” or “ Ⓗ≣ ”.
- Check the voltage (12 V) of the “Blue” lead on the bulb socket connector.

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

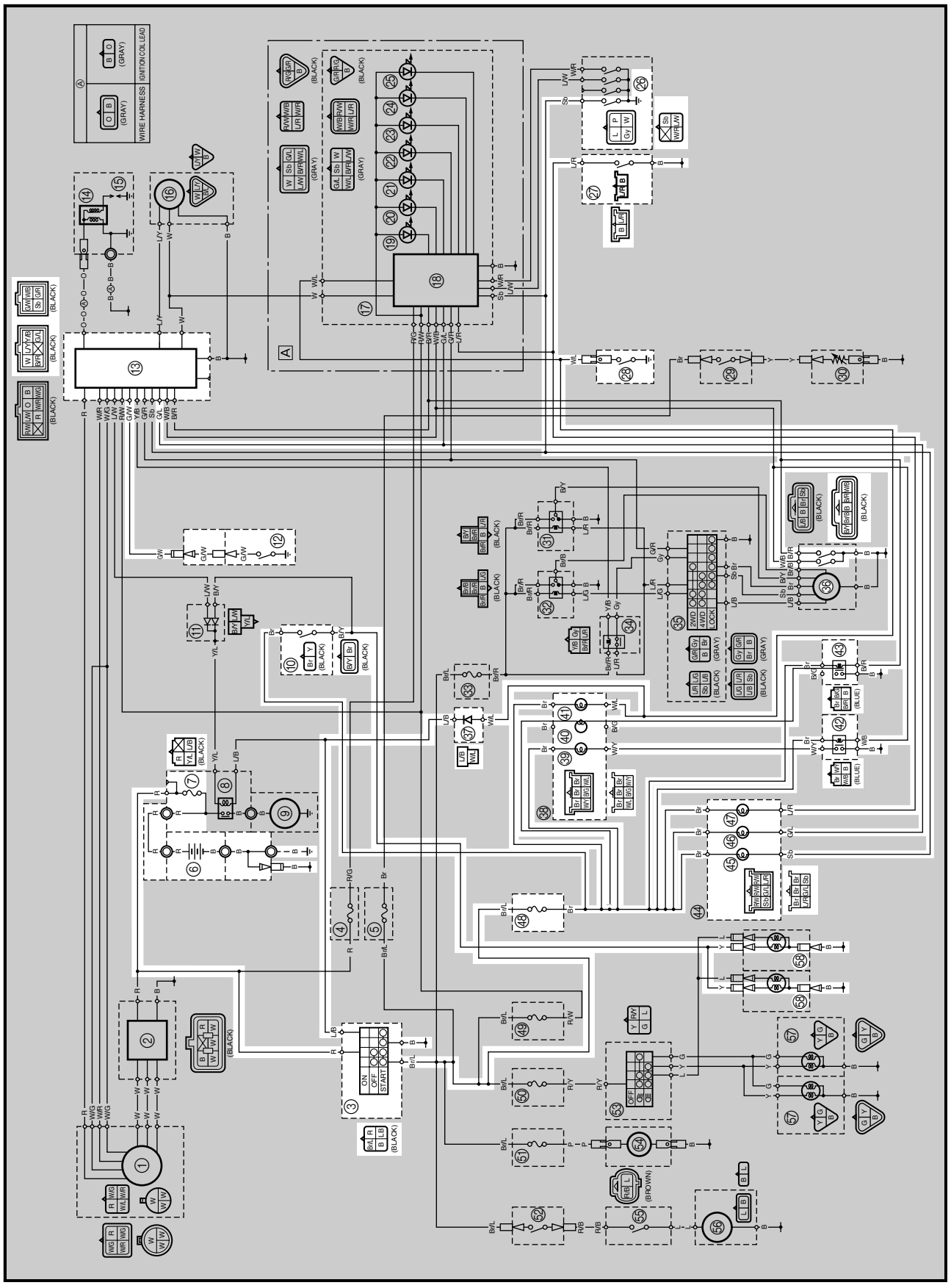
MEETS SPECIFICATION ⇩

This circuit is not faulty.

EB806000

SIGNALING SYSTEM

CIRCUIT DIAGRAM



③ Main switch
⑥ Battery
⑦ Main fuse
⑩ Brake light switch
⑫ Reverse switch
⑬ C.D.I. unit
㉖ Gear position switch
㉗ Parking brake switch
㉘ Thermo switch 1
㊱ Gear motor
㊲ Diode 2
㊴ Four-wheel drive indicator light
㊵ Differential gear lock indicator light
㊶ Coolant temperature warning light
㊷ Four-wheel drive indicator light relay
㊸ Differential gear lock indicator light relay
㊺ Neutral indicator light
㊻ Reverse indicator light
㊼ Parking brake indicator light
㊽ Signaling system fuse
㊽ Tail/brake light

EB806010
TROUBLESHOOTING

IF A BRAKE LIGHT, AN INDICATOR LIGHT, OR THE WARNING LIGHT FAILS TO COME ON:

Procedure
Check:
1. Fuses (main, signaling system)
2. Battery
3. Main switch
4. Wiring connections
   (the entire signal system)

NOTE:
- Remove the following part(s) before troubleshooting:
1) Console
- Use the following special tool(s) for troubleshooting.

Pocket tester
P/N. YU-03112-C, 90890-03112

EB802011

1. Fuses (main, signaling system)

Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ↓

EB802012

2. Battery

- Check the battery condition.
  Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage
12.8 V or more at 20 °C (68 °F)

INCORRECT → • Clean the battery terminals.
• Recharge or replace the battery.

CORRECT ↓

3. Main switch

Refer to “CHECKING THE SWITCH”.

INCORRECT → Replace the main switch.

CORRECT ↓

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EB806011

4. Wiring connections

- Check the connections of the entire signal system.
  Refer to “CIRCUIT DIAGRAM”.

POOR CONNECTION

Properly connect the signal system.

CORRECT

Check the condition of each of the signal system’s circuits.
Refer to “CHECKING THE SIGNAL SYSTEM”.

CHECKING THE SIGNAL SYSTEM

1. If the brake lights fail to come on:

1. Bulb and bulb socket
• Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

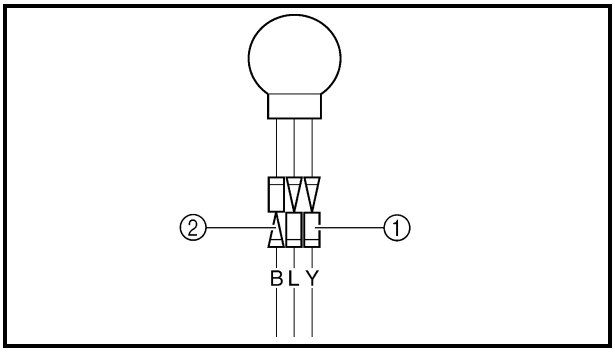
CONTINUITY ⇩

2. Brake light switch
Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the brake light switch.

CONTINUITY ⇩

3. Voltage
• Connect the pocket tester (DC 20 V) to the bulb socket connector.
Tester (+) lead → Yellow terminal ① **Tester (–) lead → Black terminal ②**



• Turn the main switch to “ON”. • Turn the light switch to “ Ⓛ≣ ” or “ Ⓗ≣ ”. • Check the voltage (12 V) of the “Yellow” lead on the bulb socket connector.

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ⇩

This circuit is not faulty.

EB806024

2. If the neutral indicator light fails to come on:

1. Bulb and bulb socket
   - Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ⇩

2. Gear position switch

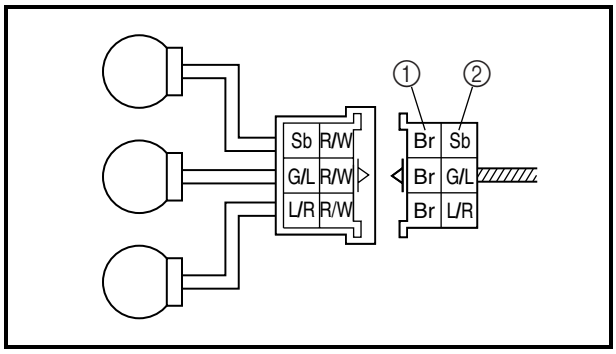
Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the gear position switch.

CONTINUITY ⇩

3. Voltage
   - Connect the pocket tester (DC 20 V) to the indicator light assembly 2 coupler.

Tester (+) lead → Brown terminal ①
Tester (–) lead → Sky blue terminal ②



- Turn the main switch to “ON”.
- Check the voltage (12 V).

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ⇩

This circuit is not faulty.

3. If the parking brake indicator light fails to come on:

1. Bulb and bulb socket
   - Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ⇩

2. Parking brake switch

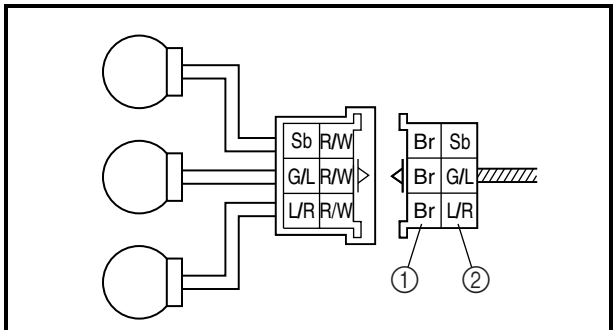
Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the parking brake switch.

CONTINUITY ⇩

3. Voltage
   - Connect the pocket tester (DC 20 V) to the indicator light assembly 2 coupler.

Tester (+) lead → Brown terminal ①
Tester (–) lead → Blue/Red terminal ②



- Turn the main switch to “ON”.
- Check the voltage (12 V).

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ⇩

This circuit is not faulty.

4. If the reverse indicator light fails to come on:

1. Bulb and bulb socket
   - Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ⇩

2. Reverse switch

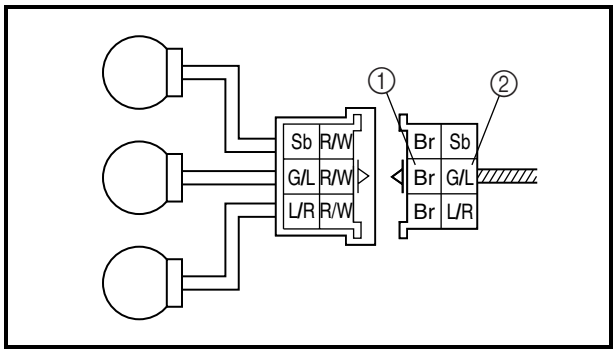
Refer to "CHECKING THE SWITCH".

NO CONTINUITY → Replace the reverse switch.

CONTINUITY ⇩

3. Voltage
   - Connect the pocket tester (DC 20 V) to the indicator light assembly 2 coupler.

Tester (+) lead → Brown terminal ①
Tester (–) lead → Green/Blue terminal ②



- Turn the main switch to "ON".
- Check the voltage (12 V).

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ⇩

Replace the C.D.I. unit.

5. If the coolant temperature warning light does not come on when the main switch to “ON”, or if the coolant temperature warning light does not come on when the temperature is high (more than 117 ~ 123 °C (242.6 ~ 253.4 °F)):

1. Bulb and bulb socket

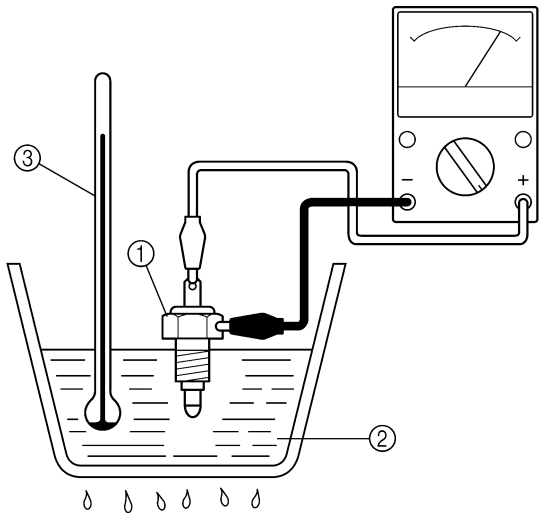
- Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and /or bulb socket.

CONTINUITY ⇩

2. Thermo switch 1

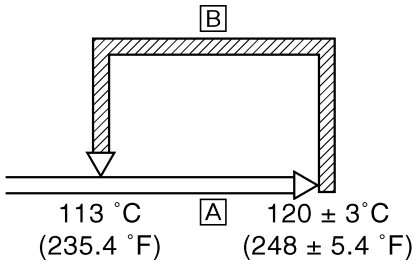
- Remove the thermo switch 1 from the cylinder head.
- Connect the pocket tester (Ω × 1) to the thermo switch 1 ①.
- Immerse the thermo switch 1 in coolant ②.
- Check the thermo switch 1 for continuity. While heating the coolant use a thermometer ③ to record the temperatures.



Ⓐ The thermo switch 1 circuit is open and the coolant temperature warning light is off.
Ⓑ The thermo switch 1 circuit is closed and the coolant temperature warning light is on.

Test step	Coolant temperature	Continuity
1	Less than 120 ± 3 °C (248 ± 5.4 °F)	No
2	More than 120 ± 3 °C (248 ± 5.4 °F)	Yes
3	More than 113 °C (235.4 °F)	Yes
4	Less than 113 °C (235.4 °F)	No

Test steps 1 & 2: Heating phase
Test steps 3 & 4: Cooling phase



⚠ WARNING

Handle the thermo switch 1 with special care.
Never subject it to a strong shock or allow it to be dropped. Should it be dropped, it must be replaced.

Thermo switch 1
8 Nm (0.8 m · kg, 5.8 ft · lb)
Three bond sealock® #10

BAD CONDITION → Replace the thermo switch 1.

GOOD CONDITION ⇩

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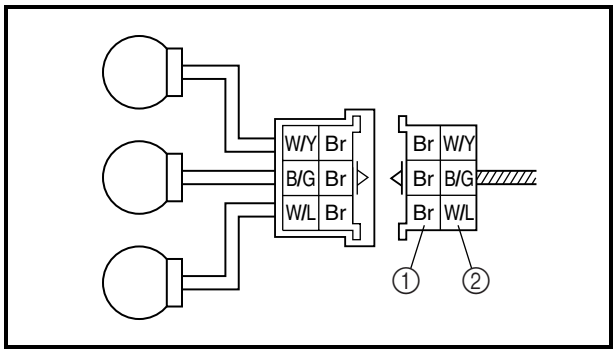
3. Voltage
• Connect the pocket tester (DC 20 V) to the indicator light assembly 1 coupler.
Tester (+) lead → Brown terminal ① **Tester (–) lead → White/Blue terminal ②**



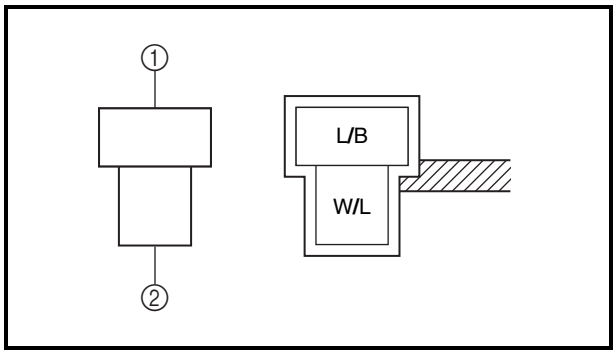
• Turn the main switch to "ON". • Check the voltage (12 V).

OUT OF SPECIFICATION

The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION

4. Diode 2
• Remove the diode from the coupler. • Connect the pocket tester (Ω × 1) to the diode terminals as shown. • Check the diode for continuity as follows.



Tester (+) lead → **Blue/Black terminal ①** **Tester (–) lead →** **White/Blue terminal ②**	**Continuity**
Tester (+) lead → **White/Blue terminal ②** **Tester (–) lead →** **Blue/Black terminal ①**	**No continuity**

NOTE:
When you switch the tester's positive and negative probes, the readings in the left chart will be reversed.

INCORRECT

Replace the diode 2.

CORRECT

This circuit is not faulty.

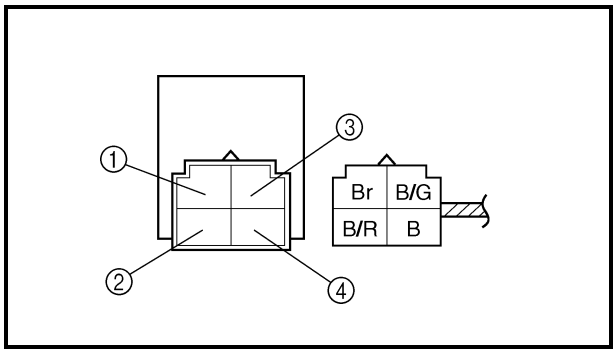
6. If the differential gear lock indicator light fails to come on:

1. Bulb and bulb socket
   - Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ⇩

2. Differential gear lock indicator light relay
   - Remove the differential gear lock indicator light relay from the wire harness.
   - Connect the pocket tester ($\Omega \times 1$) and the battery (12 V) to the differential gear lock indicator light relay terminals.
   - Check the differential gear lock indicator light relay for continuity as follows.



Tester (+) lead → Black/Green terminal ① **Tester (–) lead → Black terminal ②**	**Continuity**
Battery (+) terminal → Brown terminal ③ **Battery (–) terminal → Black/Red terminal ④**	**No continuity**
Tester (+) lead → Black/Green terminal ① **Tester (–) lead → Black terminal ②**	

NO CONTINUITY → Replace the differential gear lock indicator light relay.

CONTINUITY ⇩

3. Four-wheel drive switch
   Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the gear motor.

CONTINUITY ⇩

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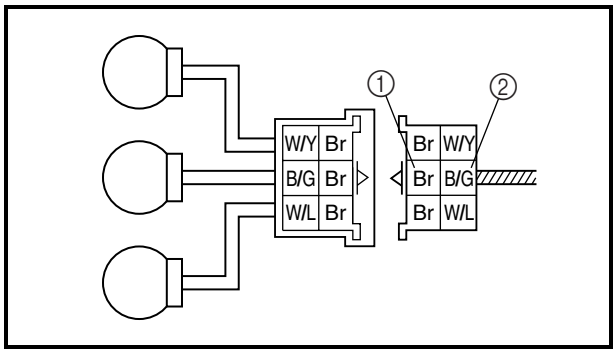
4. Voltage

- Connect the pocket tester (DC 20 V) to the indicator light assembly 1 coupler.

Tester (+) lead → Brown terminal ①
Tester (–) lead → Black/Green terminal ②



- Turn the main switch to “ON”.
- Check the voltage (12 V).

OUT OF SPECIFICATION

The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION

This circuit is not faulty.

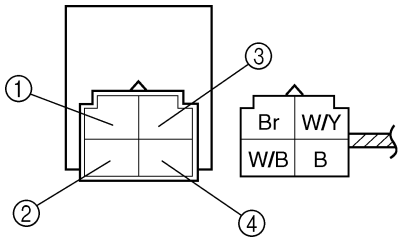
7. If the four-wheel drive indicator light fails to come on:

1. Bulb and bulb socket
• Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and bulb socket.

CONTINUITY ⇩

2. Four-wheel drive indicator light relay	
• Remove the four-wheel drive indicator light relay from the wire harness. • Connect the pocket tester ($\Omega \times 1$) and the battery (12 V) to the four-wheel drive indicator light relay terminals. • Check the four-wheel drive indicator light relay for continuity as follows.	
Tester (+) lead → White/Yellow terminal ① Tester (–) lead → Black terminal ②	**Continuity**
Battery (+) terminal → Brown terminal ③ Battery (–) terminal → White/Black terminal ④	**No continuity**
Tester (+) lead → White/Yellow terminal ① Tester (–) lead → Black terminal ②	



NO CONTINUITY → Replace the four-wheel drive indicator light relay.

CONTINUITY ⇩

3. Four-wheel drive switch
Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the gear motor.

CONTINUITY ⇩

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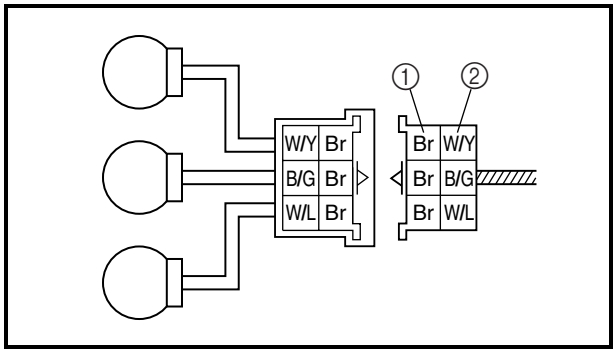
4. Voltage

- Connect the pocket tester (DC 20 V) to the indicator light assembly 1 coupler.

Tester (+) lead → Brown terminal ①
Tester (–) lead → White/Yellow terminal ②



OUT OF SPECIFICATION

- Turn the main switch to “ON”.
- Check the voltage (12 V).

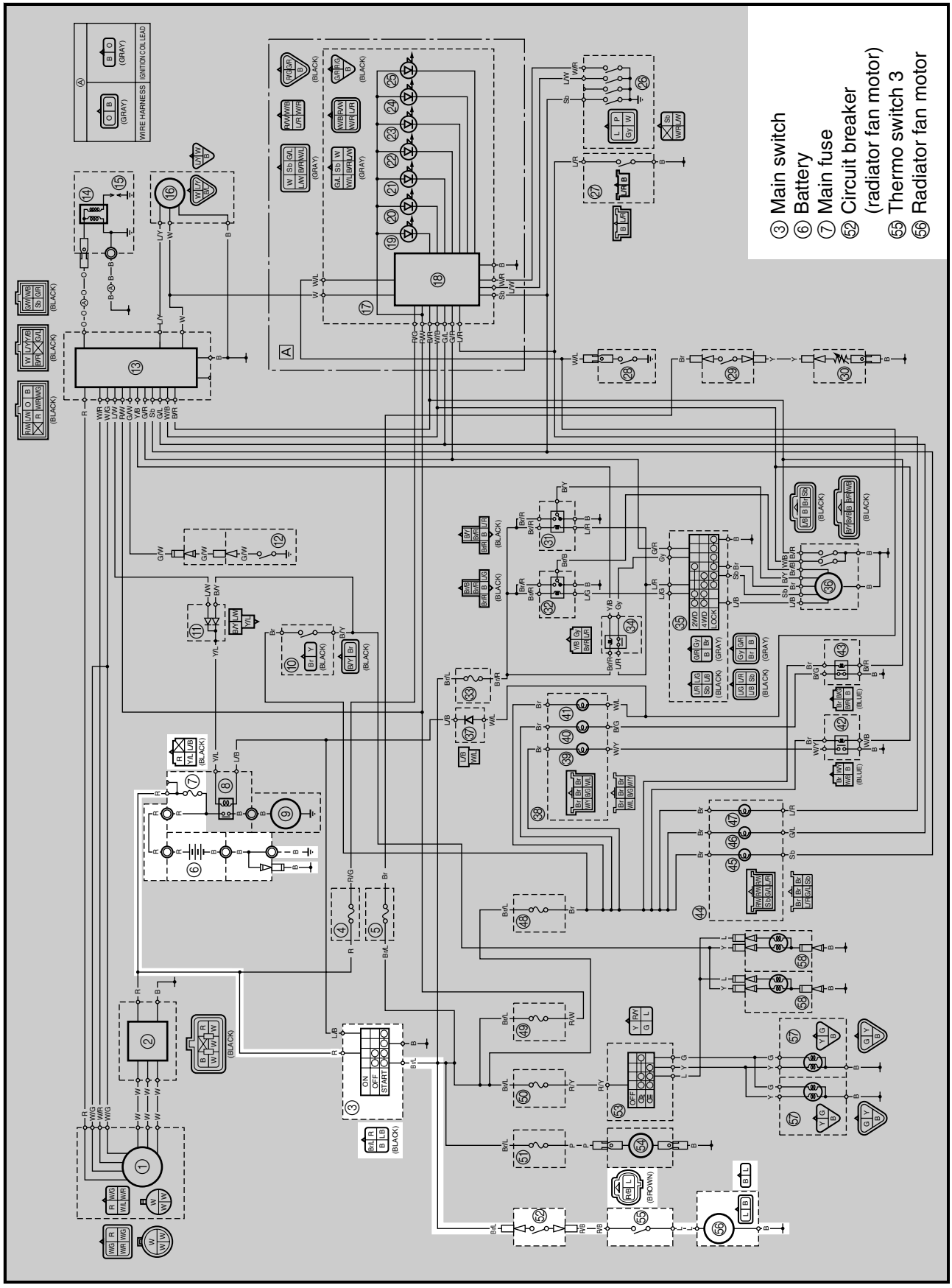
MEETS SPECIFICATION

This circuit is not faulty.

The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

COOLING SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

IF THE FAN MOTOR DOES NOT MOVE:

Procedure

Check:
1. Fuse (main)
2. Battery
3. Main switch
4. Radiator fan motor
5. Circuit breaker (radiator fan motor)
6. Thermo switch 3
7. Wiring connection
   (the entire cooling system)

NOTE:
- Remove the following part(s) before trouble-shooting.

1) Console

- Use the following special tool(s) for trouble-shooting.

Pocket tester
P/N. YU-03112-C, 90890-03112

EB802011

1. Fuse (main)

Refer to “CHECKING THE SWITCH”.

CONTINUITY ⇩

NO CONTINUITY →

Replace the fuse.

EB802012

2. Battery

- Check the battery condition.
  Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage:
12.8 V or more at 20 °C (68 °F)

CORRECT ⇩

INCORRECT →

- Clean the battery terminals.
- Recharge or replace the battery.

3. Main switch

Refer to “CHECKING THE SWITCH”.

CORRECT ⇩

INCORRECT →

Replace the main switch.

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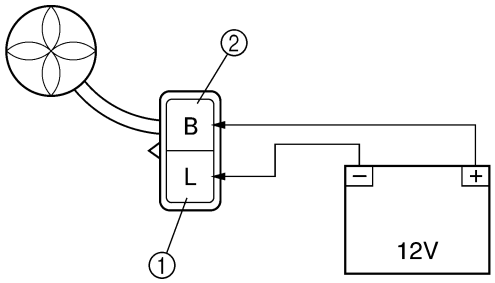
4. Radiator fan motor

- Disconnect the radiator fan motor coupler.
- Connect the battery (12 V) as shown.

Battery (+) lead → Blue terminal ①
Battery (–) lead → Black terminal ②



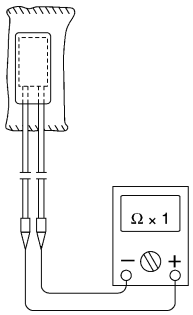
- Check the operation of the radiator fan motor.

DOES NOT TURN → Replace the radiator fan motor.

TURNS

5. Circuit breaker (radiator fan motor)

- Remove the circuit breaker from the wire harness.
- Connect the pocket tester (Ω × 1) to the circuit breaker.



Circuit breaker resistance
Zero Ω at 20 °C (68 °F)

OUT OF SPECIFICATION → Replace the circuit breaker.

MEETS SPECIFICATION

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6. Thermo switch 3

- Remove the thermo switch 3 from the radiator.
- Connect the pocket tester (Ω × 1) to the thermo switch 3 ①.
- Immerse the thermo switch 3 in coolant ②.
- Check the thermo switch 3 for continuity. While heating the coolant use a thermometer ③ to record the temperatures.

A The thermo switch 3 circuit is closed.
B The thermo switch 3 circuit is open.

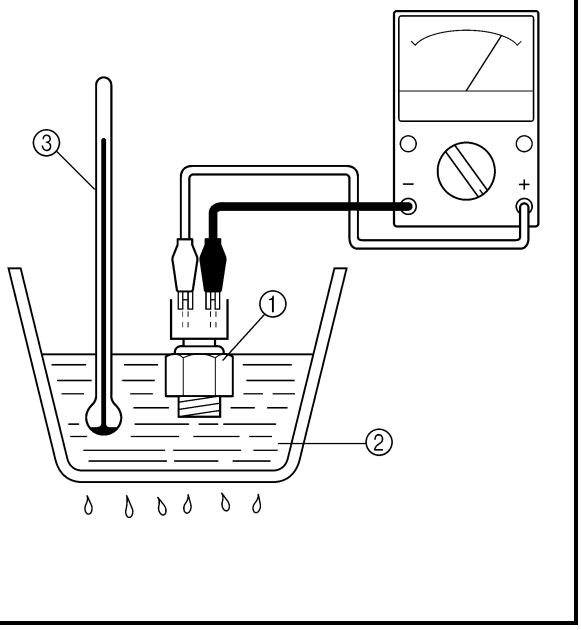
Test step	Coolant temperature	Continuity
1	Less than 75 ± 3 °C (167 ± 5.4 °F)	No
2	More than 75 ± 3 °C (167 ± 5.4 °F)	Yes
3	More than 68 °C (154.4 °F)	Yes
4	Less than 68 °C (154.4 °F)	No

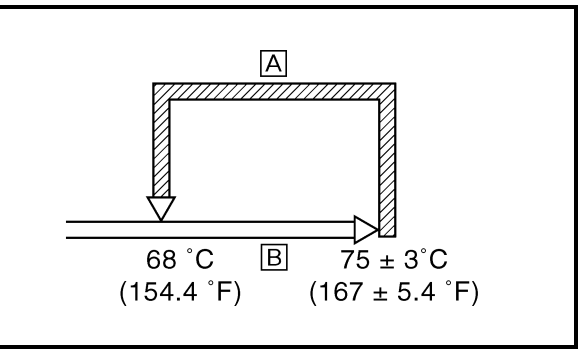
Test steps 1 & 2: Heating phase
Test steps 3 & 4: Cooling phase

⚠ WARNING

Handle the thermo switch 3 with special care.
Never subject it to a strong shock or allow it to be dropped. Should it be dropped, it must be replaced.

Thermo switch 3
28 Nm (2.8 m · kg, 20 ft · lb)





BAD CONDITION

Replace the thermo switch 3.

GOOD CONDITION

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EB803028

7. Wiring connection
• Check the connections of the entire starting system. Refer to “CIRCUIT DIAGRAM”.

POOR CONNECTION

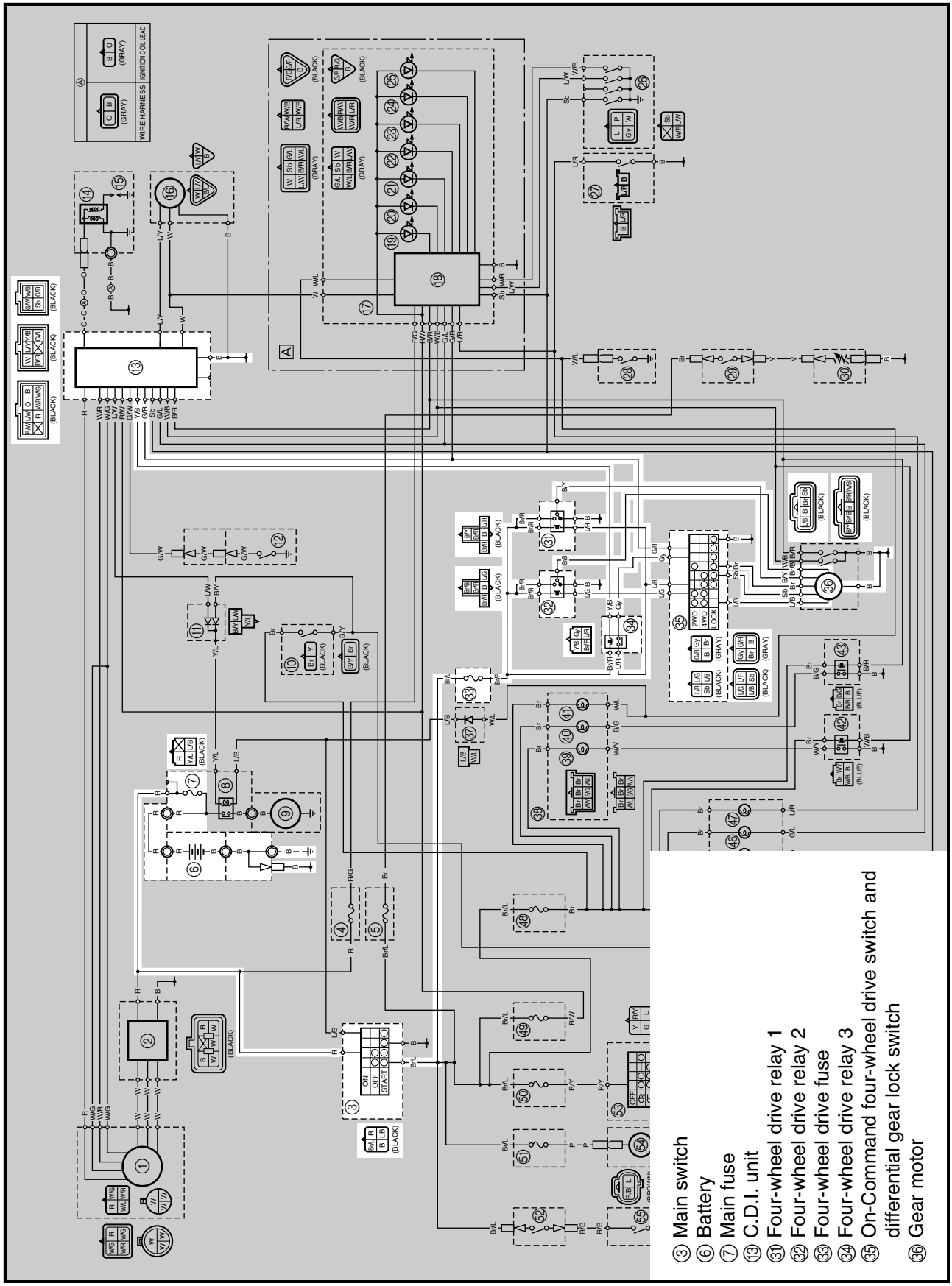
Properly connect the cooling system.

CORRECT

This circuit is not faulty.

2WD/4WD SELECTING SYSTEM

CIRCUIT DIAGRAM


③ Main switch
⑥ Battery
⑦ Main fuse
⑬ C.D.I. unit
㉛ Four-wheel drive relay 1
㉜ Four-wheel drive relay 2
㉝ Four-wheel drive fuse
㉞ Four-wheel drive relay 3
㉟ On-Command four-wheel drive switch and differential gear lock switch
㊱ Gear motor

EB803020
TROUBLESHOOTING

IF THE FOUR-WHEEL DRIVE INDICATOR FAILS TO COME ON:

Procedure
Check:
1. Fuses (main, four-wheel drive)
2. Battery
3. Main switch
4. Four-wheel drive relay 1
5. Four-wheel drive relay 2
6. Four-wheel drive relay 3
7. On-Command four-wheel drive switch and differential gear lock switch
8. Gear motor
9. Wiring connections (the entire 2WD/4WD selecting system)

NOTE:
- Remove the following part(s) before trouble-shooting:
1) Console
- Use the following special tool(s) for trouble-shooting.

Pocket tester
P/N. YU-03112-C, 90890-03112

EB802011

1. Fuses (main, four-wheel drive)

Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ⇩

EB802012

2. Battery

- Check the battery condition. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage
12.8 V or more at 20 °C (68 °F)

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.

CORRECT ⇩

3. Main switch

Refer to “CHECKING THE SWITCH”.

INCORRECT → Replace the main switch.

CORRECT ⇩

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4. Four-wheel drive relay 1

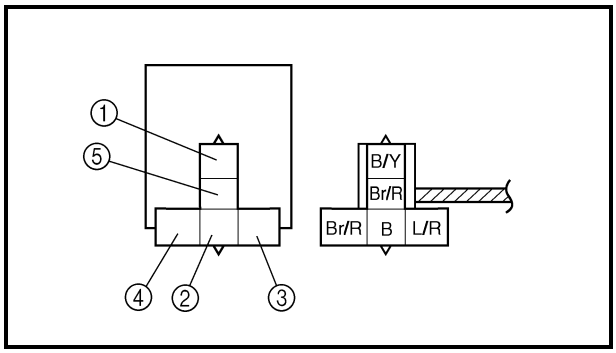
- Remove the four-wheel drive relay 1 from the wire harness.
- Connect the pocket tester (Ω × 1) and the battery (12 V) to the four-wheel drive relay 1 terminals.

Tester (+) lead →
Black/Yellow terminal ①
Tester (–) lead → Black terminal ②

Battery (+) terminal →
Brown/Red terminal ③
Battery (–) terminal →
Blue/Red terminal ④

Tester (+) lead →
Black/yellow terminal ①
Tester (–) lead → Brown/Red terminal ⑤

- Check the four-wheel drive relay 1 for continuity.



NO CONTINUITY

Replace the four-wheel drive relay 1.

CONTINUITY

5. Four-wheel drive relay 2

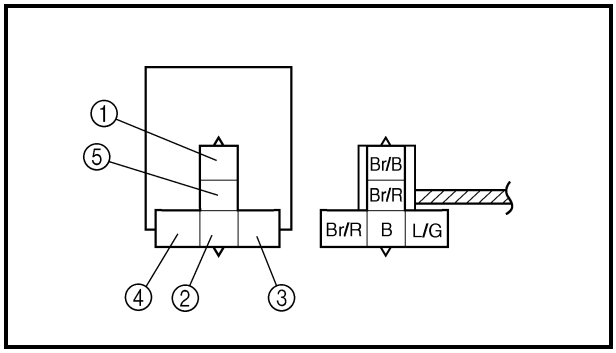
- Remove the four-wheel drive relay 2 from the wire harness.
- Connect the pocket tester (Ω × 1) and the battery (12 V) to the four-wheel drive relay 2 terminals.

Tester (+) lead →
Brown/Black terminal ①
Tester (–) lead → Black terminal ②

Battery (+) terminal →
Brown/Red terminal ③
Battery (–) terminal →
Blue/Green terminal ④

Tester (+) lead →
Brown/Black terminal ①
Tester (–) lead → Brown/Red terminal ⑤

- Check the four-wheel drive relay 2 for continuity.



NO CONTINUITY

Replace the four-wheel drive relay 2.

CONTINUITY

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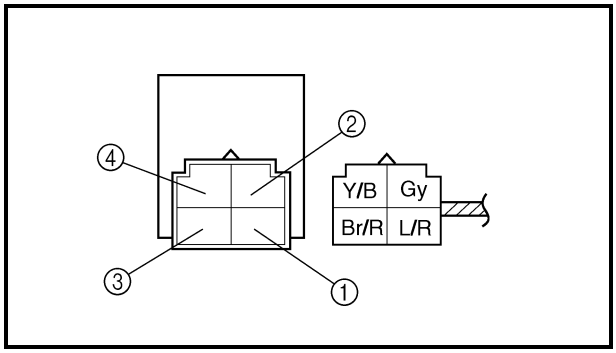
6. Four-wheel drive relay 3

- Remove the four-wheel drive relay 3 from the wire harness.
- Connect the pocket tester (Ω × 1) and the battery (12 V) to the four-wheel drive relay 3 terminals.

Battery (+) terminal →
Brown/Red terminal ①
Battery (–) terminal →
Yellow/Black terminal ②

Tester (+) lead → Blue/Red terminal ③
Tester (–) lead → Gray terminal ④

- Check the four-wheel drive relay 3 for continuity.



NO CONTINUITY

Replace the four-wheel drive relay 3.

CONTINUITY

7. On-Command four-wheel drive switch and differential gear lock switch

Refer to “CHECKING THE SWITCH”.

INCORRECT

Replace the On-Command four-wheel drive switch and differential gear lock switch.

CORRECT

*

*

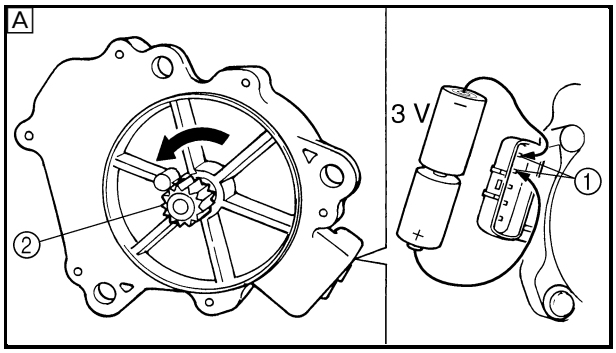
8. Gear motor

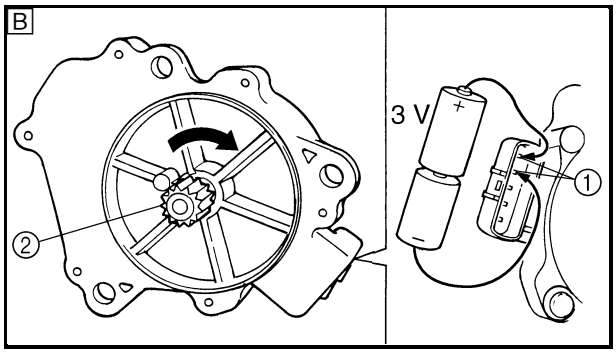
- Disconnect the gear motor coupler.
- Remove the gear motor from the differential gear case.
  Refer to "FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT" in chapter 7.
- Connect two C size batteries to the gear motor terminals ① (as shown illustrations).

A Check that the pinion gear ② turns counterclockwise.
B Check that the pinion gear ② turns clockwise.

- Make sure that the drive gear (shift fork sliding gear) operates correctly.

NOTE:
When installing the differential gear case in the gear motor, refer to "FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT" in chapter 7.





INCORRECT

Replace the gear motor.

CORRECT

EB803028

9. Wiring connection

- Check the connections of the entire 2WD/4WD selecting system.
  Refer to "CIRCUIT DIAGRAM".

POOR CONNECTION

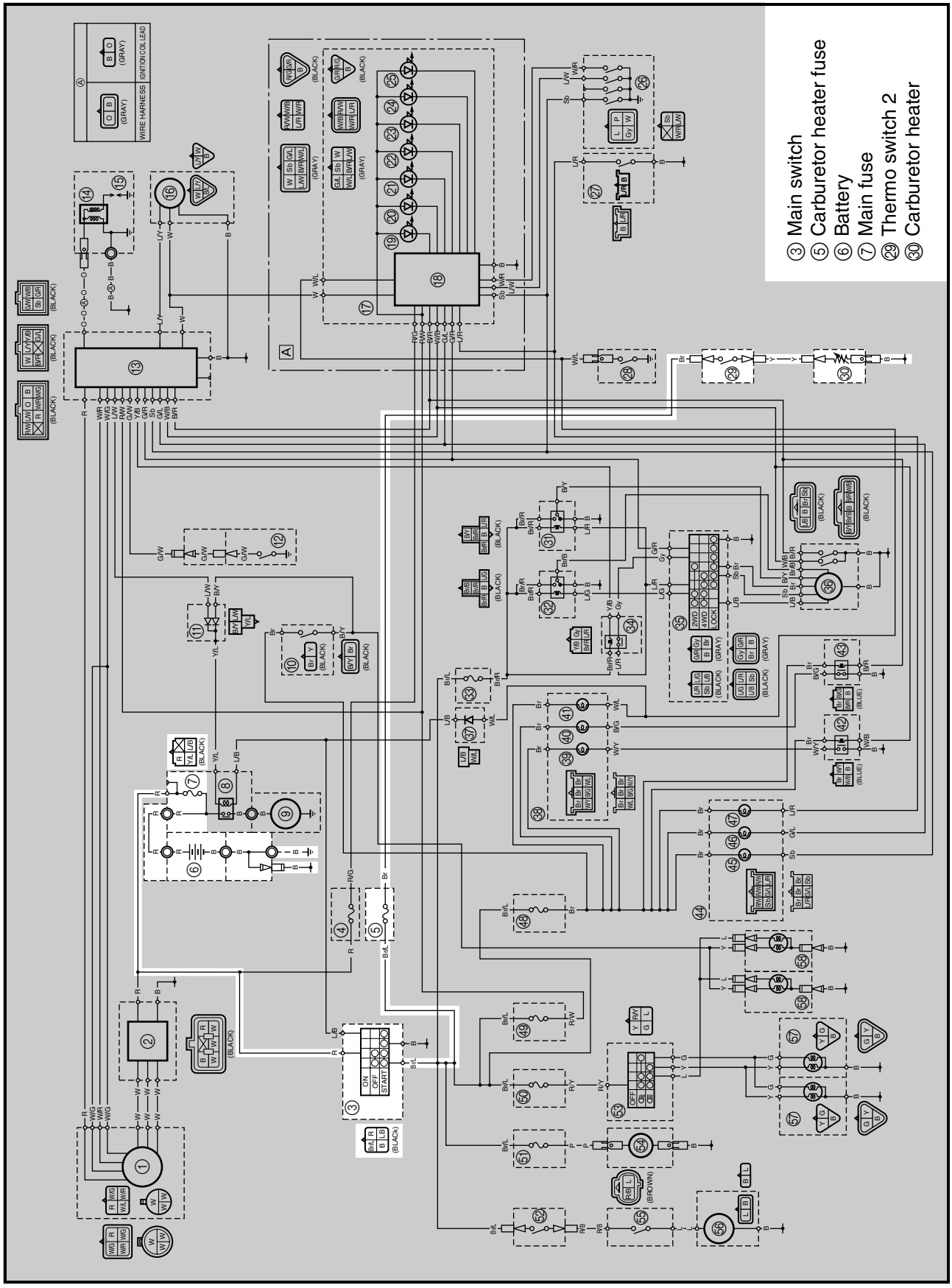
Properly connect the 2WD/4WD selecting system.

CORRECT

Replace the C.D.I. unit.

CARBURETOR HEATING SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

IF THE CARBURETOR HEATING SYSTEM FAILS TO OPERATE:

Procedure

Check:

1. Fuses (main, carburetor heater)
2. Battery
3. Main switch
4. Thermo switch 2
5. Carburetor heater
6. Wiring connection
   (the entire carburetor warning system)

NOTE:

- Remove the following part(s) before troubleshooting.

1) Console

- Use the following special tool(s) for troubleshooting.

Pocket tester
P/N. YU-03112-C, 90890-03112

1. Fuses (main, carburetor heater)

Refer to “CHECKING THE SWITCH”.

NO CONTINUITY → Replace the fuse(s).

CORRECT ↓

2. Battery

- Check the battery condition.
  Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage
12.8 V or more at 20 °C (68 °F)

INCORRECT →

- Clean the battery terminals.
- Recharge or replace the battery.

CORRECT ↓

3. Main switch

Refer to “CHECKING THE SWITCH”.

INCORRECT → Replace the main switch.

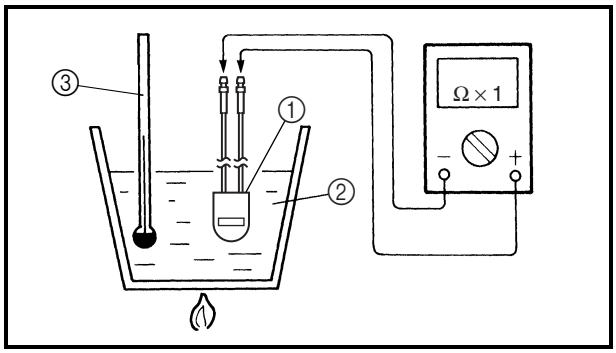
CORRECT ↓

*

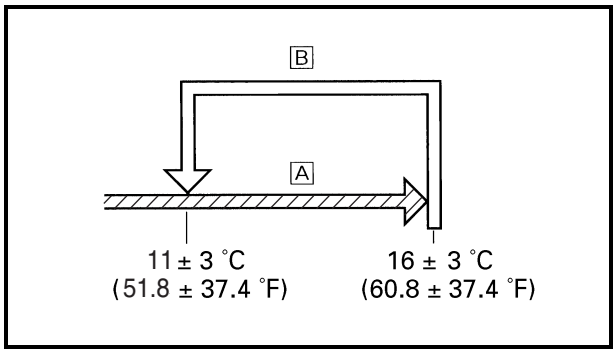
*

4. Thermo switch 2

- Remove the thermo switch 2 from the wire harness.
- Connect the pocket tester (Ω × 1) to the thermo switch 2 ①.
- Immerse the thermo switch 2 in a container filled with water ②.
- Place a thermometer ③ in the water.
- Slowly heat the water, than let it cool to the specified temperature as indicated in the table.
- Check the thermo switch 2 for continuity at the temperatures indicated in the table.



A The thermo switch 2 circuit is closed.
B The thermo switch 2 circuit is open.



Test step	Water temperature	Continuity
1	Less than 16 ± 3 °C (60.8 ± 37.4 °C)	Yes
2	More than 16 ± 3 °C (60.8 ± 37.4 °C)	No
3	More than 11 ± 3 °C (51.8 ± 37.4 °C)	No
4	Less than 11 ± 3 °C (51.8 ± 37.4 °C)	Yes

Test steps 1 & 2: Heating phase
Test steps 3 & 4: Cooling phase

BAD CONDITION

Replace the thermo switch 2.

GOOD CONDITION

*

*

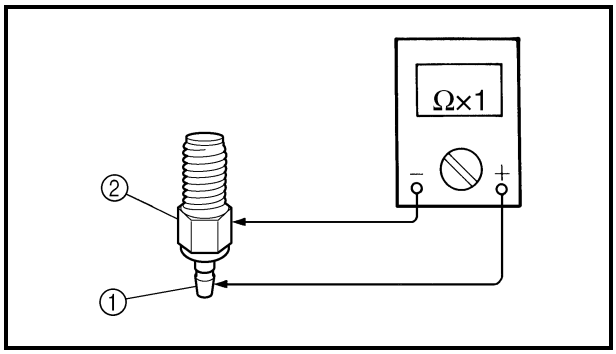
5. Carburetor heater

- Remove the carburetor heater from the carburetor.
- Connect the pocket tester (Ω × 1) to the carburetor heater.

Tester (+) lead →
Carburetor heater terminal ①
Tester (–) lead →
Carburetor heater body ②

- Measure the carburetor heater resistance.

Carburetor heater resistance
6 ~ 12 Ω at 20 °C (68 °F)



INCORRECT

Replace the carburetor heater.

CORRECT

6. Wiring connection

- Check the connections on the entire carburetor heating system.
  Refer to “CIRCUIT DIAGRAM”.

POOR CONNECTION

Properly connect the carburetor heating system.

CORRECT

This circuit is not faulty.

EBS00537

TROUBLESHOOTING

NOTE:

The following troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to troubleshooting. Refer to the relative procedure in this manual for check, adjustment and replacement of parts.

STARTING FAILURE/HARD STARTING

FUEL SYSTEM

Fuel tank
- Empty
- Clogged fuel filter
- Clogged fuel breather hose
- Deteriorated or contaminated fuel

Fuel pump
- Clogged fuel hose
- Damaged vacuum hose

Carburetor
- Deteriorated or contaminated fuel
- Clogged pilot jet
- Clogged pilot air passage
- Sucked-in air
- Deformed float
- Worn needle valve
- Improperly sealed valve seat
- Improperly adjusted fuel level
- Improperly set pilot jet
- Clogged starter jet
- Starter plunger malfunction

Air filter
- Clogged air filter element

ELECTRICAL SYSTEM

Spark plug
- Improper plug gap
- Worn electrodes
- Wire between terminals broken
- Improper heat range
- Faulty spark plug cap

Ignition coil
- Broken or shorted primary/secondary
- Faulty spark plug lead
- Broken body

C.D.I. system
- Faulty C.D.I. unit
- Faulty pickup coil
- Broken woodruff key

Switches and wiring
- Faulty main switch
- Broken or shorted wiring
- Faulty gear position switch
- Faulty brake light switch

Starter motor
- Faulty starter motor
- Faulty starter relay
- Faulty starter clutch

Battery
- Faulty battery

COMPRESSION SYSTEM

Cylinder and cylinder head
- Loose spark plug
- Loose cylinder head or cylinder
- Broken cylinder head gasket
- Broken cylinder gasket
- Worn, damaged or seized cylinder

Valve, camshaft and crankshaft
- Improperly sealed valve
- Improperly contacted valve and valve seat
- Improper valve timing
- Broken valve spring
- Seized camshaft
- Seized crankshaft

Piston and piston rings
- Improperly installed piston ring
- Worn, fatigued or broken piston ring
- Seized piston ring
- Seized or damaged piston

Crankcase and crankshaft
- Improperly seated crankcase
- Seized crankshaft

Valve train
- Improperly adjusted valve clearance
- Improperly adjusted valve timing

EBS00538

POOR IDLE SPEED PERFORMANCE

POOR IDLE SPEED PERFORMANCE

Carburetor
- Improperly returned starter plunger
- Loose pilot jet
- Clogged pilot jet
- Clogged pilot air jet
- Improperly adjusted idle speed (throttle stop screw)
- Improper throttle cable play
- Flooded carburetor

Electrical system
- Faulty spark plug
- Faulty C.D.I. unit
- Faulty pickup coil
- Faulty charging/rotor rotation direction detection coil
- Faulty ignition coil

Valve train
- Improperly adjusted valve clearance

Air filter
- Clogged air filter element

EBS00539

POOR MEDIUM AND HIGH-SPEED PERFORMANCE

POOR MEDIUM AND HIGH-SPEED PERFORMANCE

Refer to “STARTING FAILURE/HARD STARTING” and “POOR IDLE SPEED PERFORMANCE—Valve train”.

Carburetor
- Improper jet needle clip position
- Improperly adjusted fuel level
- Clogged or loose main jet
- Deteriorated or contaminated fuel

Air filter
- Clogged air filter element

EBS00540

FAULTY DRIVE TRAIN

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
1. A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.) 2. A “rolling rumble” noticeable at low speed; a high-pitched whine; a “clunk” from a shaft drive component or area. 3. A locked-up condition of the shaft drive mechanism, no power transmitted from the engine to the front and/or rear wheels.	A. Bearing damage. B. Improper gear lash. C. Gear tooth damage. D. Broken drive shaft. E. Broken gear teeth. F. Seizure due to lack of lubrication. G. Small foreign objects lodged between the moving parts.

NOTE:

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

EBS00542

FAULTY GEAR SHIFTING

HARD SHIFTING

Refer to “CLUTCH SLIPPING”.

SHIFT LEVER DOES NOT MOVE

Shift drum, shift forks
- Groove jammed with impurities
- Seized shift fork
- Bent shift fork guide bar

Transmission
- Seized transmission gear
- Jammed impurities
- Incorrectly assembled transmission

Shift guide
- Broken shift guide

JUMPS OUT OF GEAR

Shift forks
- Worn shift fork

Shift drum
- Improper thrust play
- Worn shift drum groove

Transmission
- Worn gear dog

EBS00543

FAULTY CLUTCH PERFORMANCE

ENGINE OPERATES BUT VEHICLE WILL NOT MOVE

V-belt
- Bent, damaged or worn V-belt
- V-belt slips

Primary pulley cam and primary pulley slider
- Damaged or worn primary pulley cam
- Damaged or worn primary pulley slider

Transmission
- Damaged transmission gears

CLUTCH SLIPPING

Clutch spring
- Damaged, loose or worn clutch shoe spring

Clutch shoe
- Damaged or worn clutch shoe

Primary sliding sheave
- Seized primary sliding sheave

POOR STARTING PERFORMANCE

V-belt
- V-belt slips
- Oil or grease on the V-belt

Primary sliding sheave
- Faulty operation
- Worn pin groove
- Worn pin

Clutch shoe
- Bent, damaged or worn clutch shoe

POOR SPEED PERFORMANCE

V-belt
- Oil or grease on the V-belt

Primary pulley weight
- Faulty operation
- Worn primary pulley weight

Primary fixed sheave
- Worn primary fixed sheave

Primary sliding sheave
- Worn primary sliding sheave

Secondary fixed sheave
- Worn secondary fixed sheave

Secondary sliding sheave
- Worn secondary sliding sheave

EBS00547

OVERHEATING

OVERHEATING

Ignition system
- Improper spark plug gap
- Improper spark plug heat range
- Faulty C.D.I. unit

Fuel system
- Improper carburetor main jet (improper setting)
- Improper fuel level
- Clogged air filter element

Compression system
- Heavy carbon deposit

Engine oil
- Improper oil level
- Improper oil viscosity
- Inferior oil quality

Brake
- Brake drag

Cooling system
- Low coolant level
- Clogged or damaged radiator
- Damaged or faulty water pump
- Faulty fan motor
- Faulty thermo switch

Oil cooling system
- Clogged or damaged oil cooler

EBS00550

FAULTY BRAKE

POOR BRAKING EFFECT

Disc brake
- Worn brake pads
- Worn disc
- Air in brake fluid
- Leaking brake fluid
- Faulty master cylinder kit cup
- Faulty caliper kit seal
- Loose union bolt
- Broken brake hose and pipe
- Oily or greasy disc/brake pads
- Improper brake fluid level

EBS00551

SHOCK ABSORBER MALFUNCTION

MALFUNCTION

- Bent or damaged damper rod
- Damaged oil seal lip
- Fatigued shock absorber spring

EBS00552

UNSTABLE HANDLING

UNSTABLE HANDLING

Steering wheel
- Improperly installed or bent

Steering
- Incorrect toe-in
- Bent steering shaft
- Improperly installed steering shaft
- Damaged bearing
- Bent tie-rods
- Deformed steering knuckles

Tires
- Uneven tire pressures on both sides
- Incorrect tire pressure
- Uneven tire wear

Wheels
- Deformed wheel
- Loose bearing
- Bent or loose wheel axle
- Excessive wheel runout

Frame
- Bent
- Damaged frame

EBS00553

LIGHTING SYSTEM

HEADLIGHT DOES NOT COME ON
- Improper bulb
- Too many electric accessories
- Hard charging (broken stator coil and/or faulty rectifier/regulator)
- Incorrect connection
- Improperly grounded
- Poor contacts (main or lights switch)
- Bulb life expired

BULB BURNT OUT
- Improper bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded
- Faulty main and/or lights switch
- Bulb life expired

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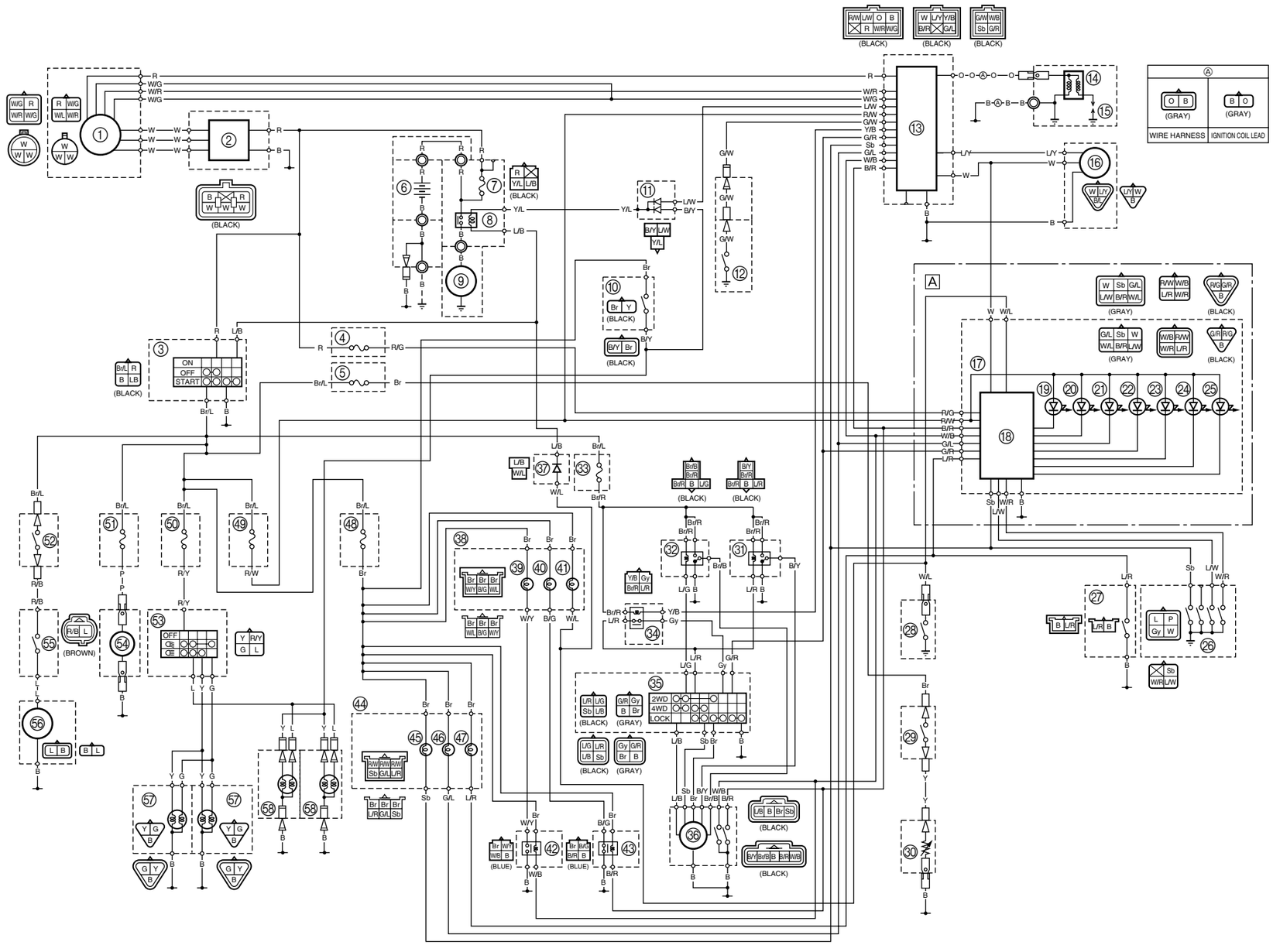
YXR660FAS WIRING DIAGRAM



① A.C. magneto
② Rectifier/regulator
③ Main switch
④ Backup fuse
⑤ Carburetor heater fuse
⑥ Battery
⑦ Main fuse
⑧ Starter relay
⑨ Starter motor
⑩ Brake light switch
⑪ Diode 1
⑫ Reverse switch
⑬ C.D.I. unit
⑭ Ignition coil
⑮ Spark plug
⑯ Speed sensor
⑰ Meter assembly
⑱ Multi-function meter
⑲ Differential gear lock indicator light
⑳ Coolant temperature warning light
㉑ Reverse indicator light
㉒ Neutral indicator light
㉓ Parking brake indicator light
㉔ High-range indicator light
㉕ Low-range indicator light
㉖ Gear position switch
㉗ Parking brake switch
㉘ Thermo switch 1
㉙ Thermo switch 2
㉚ Carburetor heater
㉛ Four-wheel drive relay 1
㉜ Four-wheel drive relay 2
㉝ Four-wheel drive fuse
㉞ Four-wheel drive relay 3
㉟ On-Command four-wheel drive switch and differential gear lock switch
㊱ Gear motor
㊲ Diode 2
㊳ Indicator light assembly 1
㊴ Four-wheel drive indicator light
㊵ Differential gear lock indicator light
㊶ Coolant temperature warning light
㊷ Four-wheel drive indicator light relay
㊸ Differential gear lock indicator light relay
㊹ Indicator light assembly 2
㊺ Neutral indicator light
㊻ Reverse indicator light
㊼ Parking brake indicator light
㊽ Signaling system fuse
㊾ Ignition fuse
㊿ Lighting system fuse
(51) Auxiliary DC jack fuse
(52) Circuit breaker (radiator fan motor)
(53) Light switch
(54) Auxiliary DC jack
(55) Thermo switch 3
(56) Radiator fan motor
(57) Headlight
(58) Tail/brake light

Ⓐ Optional

COLOR CODE

B..... Black	W ..... White	G/R ..... Green/Red	R/W ..... Red/White
Br ..... Brown	Y ..... Yellow	G/W ..... Green/White	R/Y ..... Red/Yellow
G ..... Green	B/G..... Black/Green	L/B ..... Blue/Black	W/B..... White/Black
Gy ..... Gray	B/R..... Black/Red	L/G..... Blue/Green	W/G ..... White/Green
L ..... Blue	B/Y ..... Black/Yellow	L/R ..... Blue/Red	W/L ..... White/Blue
O ..... Orange	Br/B..... Brown/Black	L/W ..... Blue/White	W/R ..... White/Red
P..... Pink	Br/L ..... Brown/Blue	L/Y ..... Blue/Yellow	W/Y..... White/Yellow
R ..... Red	Br/R..... Brown/Red	R/B..... Red/Black	Y/B..... Yellow/Black
Sb..... Sky blue	G/L ..... Green/Blue	R/G ..... Red/Green	